This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

ARNOLD ARBORETUM J. P.

Harvard College
Library

THE
GEORGE A. PARKER
COLLECTION
OF
PARK REPORTS

RF
N819t

TREE PLANTING,

INDEXED.
No. 5708
Box 370
G. A. PARKER.

AND

SCHOOLS OF FORESTRY IN EUROPE,

WITH OTHER PAPERS.

BY

B. G. NORTHROP,

SECRETARY CONNECTICUT BOARD OF EDUCATION.

PRICE, TWENTY-FIVE CENTS.

NEW YORK:
ORANGE JUDD COMPANY,
245 BROADWAY.
1879.

TREE PLANTING,

AND

SCHOOLS OF FORESTRY IN EUROPE,

WITH OTHER PAPERS.

BY

B. G. NORTHROP,

SECRETARY CONNECTICUT BOARD OF EDUCATION.

PRICE, TWENTY-FIVE CENTS.

NEW YORK:
ORANGE JUDD COMPANY,
245 BROADWAY.
1879.

For 570. 21

56,032
June 4, 1920

These papers, reprinted from an official Report, retain a few local allusions to show the original aim of the writer and the application of kindred facts and plans to other fields. Public interest in home and rural adornment is rapidly increasing in Connecticut, where some fifty associations for Village Improvement have been already organized. A little foresight will show that no community can afford to be without such an association. This good work should go on till not a school house, dwelling or street is left without the simple and grand adornment of shade trees, or shrubbery, vines, flowers or lawn. In many towns such organizations have already done incalculable good in cultivating public spirit, quickening social and intellectual life, and enhancing the value of real estate. I shall be happy to co-operate with public-spirited citizens who are moving in this matter, and will lecture on this subject without charge either for services or expenses in any town in Connecticut.

CONTENTS.

TREE PLANTING, - - - - - - - - - 3
SCHOOLS OF FORESTRY, - - - - - - - - 33
INDUSTRIAL SCHOOLS, - - - - - - - - 50
EDUCATION AND LABOR, - - - - - - - 61
WHAT BOYS ARE READING, - - - - - - - 65
WHAT SHOULD OUR BOYS READ? - - - - - - 71
COMPULSORY EDUCATION IN ENGLAND, - - - - - - 75

HARVARD COLLEGE LIBRARY
GEORGE A. PARKER
COLLECTION OF PARK REPORTS
GIFT OF THE
HARTFORD PARK COMMISSIONERS
JAN. 14, 1927

ECONOMIC TREE-PLANTING.

BY HON. B. G. NORTHROP.

Being neither a scientist nor farmer, I have made no original investigations or practical experiments in forestry. Lest I may seem presumptuous in attempting to instruct others on a great subject in which I am myself a novice, reference is made to my opportunities for learning the matured views of those who, devoting their lives to this study, have made investigations and experiments on a broad scale. Three months of last summer were occupied in visiting "the Foresters," forest schools, and forest plantations of Europe. The letter of Governor Hubbard,* and one from Hon. Wm. M. Evarts, Secretary of State, bespeaking the coöperation of our ministers and consuls, whose aid might be needed, gave free access to all desired sources of information, especially the official "Departments of Forestry," forest schools and their professors, forest plantations, national, communal, or private, and their managers, and the parks and gardens on the Continent and in England. With note-book always in hand, I conferred with numerous authors in this department, as well as practical foresters. Gathering facts from so many experts, and condensing statements from so many sources, it is impracticable in this address to formally quote their language, which I have freely modified and abridged. In addition to the professors of the forest schools visited, and to many diplomatic agents, I

---

*EXECUTIVE DEPARTMENT, HARTFORD, CONN., June 12, 1877.

I have signed these presents for the purpose of duly accrediting the Hon. B. G. Northrop, of the Board of Education of this State, who is commissioned by said Board to visit the Schools of Forestry and Forest Plantations, and the Industrial Schools of Europe, and report the results of his observations for the benefit of the schools and people of this State, and especially to encourage the reclamation of waste lands by the propagation of trees. I beg to commend Mr. Northrop to the courtesies and co-operation of all persons to whom these presents shall come, and particularly to those who are managers of the institutions above named, and are interested therein. In testimony whereof, I have hereunto set my hand. RICHARD D. HUBBARD.

am especially indebted to Hon. George P. Marsh, the American Minister to Rome, Captain Campbell Walker, Conservator of State Forests in New Zealand, J. C. Brown, LL. D., long Colonial Botanist at Cape of Good Hope, and J. McGregor, Forester of the Duke of Athole, for information given in personal interviews as well as for that derived from their published works.

The literature of forestry, already large, is now rapidly increasing by the coöperation of professors in forest schools, and government officials specially commissioned to investigate different branches of the subject, and many other writers. A German catalogue gives the titles of 1,815 volumes on forestry issued prior to 1842, and the titles of 650 works published in the six years prior to 1876. On an average, over one hundred new books on forestry appear annually in the German language. One of the Spanish Commissioners to the Centennial Exposition, Señor Morera, published a list of 1,126 volumes on forestry in the Spanish language alone.

Little attention has been given in this country to sylviculture. Nature has been wonderfully bountiful in the magnificent forests which once adorned this land, but our people have been recklessly prodigal in wasting this rich inheritance. As if they were the enemies of man, forests have been consumed without a thought of renewing them, and fire has been made to help the axe in destroying what it required ages to produce.

The progress of a nation may be measured to a large extent by its consumption of wood. Extensively as brick, stone, and iron may be substituted for wood in building, and coal used for fuel, the timber demand for purposes of utility and ornament will everywhere increase as civilization advances. The railways are enormous consumers of wood. Says Professor C. S. Sargent: "Supposing the life of a sleeper is seven years, the 85,000 miles of track in the United States consume annually 34,000,000 sleepers, or thirty years' growth on 68,000 acres of the best natural woodlands. At least 125,000 miles of fencing are required to enclose the railroads of the country, costing not less than $43,000,000, with large expenditures for annual

repairs. For the construction of 65,000 miles of telegraph lines in the United States, 2,000,000 trees for poles were required, while the annual repairs must call for 250,000 more." A late Agricultural Report of Illinois says: "The fences of the United States cost more than any other class of property except real estate and railroads; the total amount being estimated at eighteen hundred millions of dollars, with an annual expense of ninety-eight millions for repairs." Desirable as may be live hedges, stone walls or ditches, wooden fences are likely to be long used.

But aside from the need of fencing, and the demands for railway and telegraph companies, there are nearly seventy occupations enumerated in the last United States census which in whole or in part use wood as their raw material for manufacture, employing more than one million of artisans, such as carpenters, cabinet-makers, chair-makers, coach-makers, coopers, boat and ship builders, wheelwrights, manufacturers of brooms, brushes, matches, furniture, agricultural implements, machinery and the like. There are 63,928 establishments manufacturing articles made entirely of wood, employing 393,387 persons, and using materials worth $309,921,403 annually. There are, besides, 109,512 establishments in which wood is an important material, as for example, in pianos, carriages, bridges and ships, employing 700,915 persons, and using materials worth $488,530,844. With these facts before us, there need be no fear of an overproduction of wood. It is estimated that in our whole country over three million acres of wood-growing land are cleared annually, and this usually without any proper plans for reforesting them. Favorably situated as Connecticut is, in the midst of these industries and near the great market centers, and with new calls for exportation, there is sure to be a growing demand for all desirable lumber.

George Peabody, who did so much to encourage schools and learning, originated the motto, so happily illustrated by his own munificent gifts to promote education: "Education—the debt of the present to future generations." We owe it to our children to leave our lands the better for our tillage, and we

wrong both ourselves and them if our fields are impoverished by our improvidence. But much as foresight is admired when its predictions are realized and its achievements made, all history too plainly tells that the mass of men are not easily persuaded to provide for exigencies far in the future. It was more than two centuries after the death of Bernard Palissy, the famous "Potter of the Tuilleries," and after many sad lessons of devastating mountain torrents resulting from excessive forest denudation, before France learned to heed his earnest warning. Expressing his indignation at the folly of such general destruction of the woods he said: "I call it not error, but a curse and a calamity to all France. When I consider the value of the least clump of trees, I marvel at the great ignorance of men who do now-a-days study only to break down, fell and waste the fair forests which their forefathers did guard so choicely. I would think no evil of them for cutting down the woods, did they but replant some part of them again, but they care naught for the time to come, neither reck they of the great damage they do to their children." In 1680, the eminent French statesman, Colbert, said to Louis XIV.: "France will perish for want of wood."

It was not, however, till 1859 and 1860 that stringent laws were passed for the protection of existing woodlands and the formation of new forests. The former of these laws passed the Assembly by a vote of 246 against 4, and the latter with but a single negative voice. The unanimity with which these laws were enacted, though they seriously interfere with the rights of private domain, shows at last the strength of the popular conviction that the protection and extension of forests were matters of national interest and necessity, and would arrest the devastations of mountain torrents and river inundations. The law of 1860 appropriated 10,000,000 francs, at the rate of 1,000,000 a year, in aiding the replanting of woods. In 1865 a bill was passed for securing the soil in exposed localities by grading, and the formation of greensward.

This measure, proved to be beneficial in France, Mr. Marsh highly recommends for adoption in the United States. The leading features of this system are marking out and securing

from pasturage and browsing a zone along the banks of ravines, which is carefully turfed and planted with shrubs and trees; consolidating the scarps of the ravines by grading and wattling and establishing barriers of solid masonry, or more commonly of fascines, or other simple materials across the bed of the stream, and cutting narrow terraces along the scarps. Many hundred ravines, formerly the channels of formidable torrents, have been secured by barriers, and by grading and planting, and the success of the system has far surpassed all expectation. The plan of *circling*, long used in this country, is now adopted in France. This plan prevents the wash of the surface, and provides irrigation by running horizontal furrows along the hill-sides, and thus cheaply securing a succession of small terraces, checking the rapid flow of the surface water, obviating one cause of inundations, and greatly fertilizing the lands thus irrigated.

The evils of widespread forest denudation both as regards climatic changes, *uniform* flow of springs and streams, devastation by mountain torrents, and the exhaustion of once fertile lands, have been long and sadly felt in the Old World. Many rich and fertile countries have become arid wastes when denuded of trees. The Mediterranean coast of Africa is a case in point. Tunis and Algiers were once fertile regions, supporting a dense population. Their decadence is traceable largely to the destruction of their forests. Rentzsch ascribes the political decadence of Spain almost wholly to the destruction of the forests.

Mr. George P. Marsh says: "There are parts of Asia Minor, of Northern Africa, of Greece, and even of Alpine Europe, where causes set in action by man have brought the face of the earth to a desolation as complete as that of the moon, and yet they are known to have been once covered with luxuriant woods, verdant pastures, and fertile meadows; and a dense population formerly inhabited those *now* lonely districts. The fairest and fruitfulest provinces of the Roman empire once endowed with the greatest superiority of soil, climate, and position, are completely exhausted of their fertility, or so diminished in their productiveness as, with the

exception of a few favored cases that have escaped the general ruin, to be no longer capable of affording sustenance to civilized man. If to this realm of desolation we add the now wasted and solitary soils of Persia and the remoter East, that once fed their millions with milk and honey, we shall see that a territory larger than all Europe, the abundance of which sustained in by-gone centuries a population scarcely inferior to that of the whole Christian world at the present day, has been entirely withdrawn from human use, or at best is inhabited by tribes too few, poor, and uncultivated to contribute anything to the general, moral, or material interests of mankind. The destructive changes occasioned by the agency of man upon the flanks of the Alps, the Appenines, the Pyrenees, and other mountain ranges of Central and Southern Europe, and the progress of physical deterioration, have become so rapid that in some localities a single generation has witnessed the beginning and the end of the melancholy revolution. A destruction like that which has overwhelmed many once beautiful and fertile regions of Europe awaits an important part of the territory of the United States, unless prompt measures are taken to check the action of the destructive causes already in operation."

Indeed we have already a great Sahara in Connecticut produced by improvidence and neglect. The local traditions tell us that the "sand-blow," covering so large an area in the towns of North Haven and Wallingford, which, with its clouds of dust, is a literal eye-sore to all travelers on the New Haven & Hartford Railway, was once finely wooded. Here and there clumps of low cedars and pines, the lone relics of a former growth, still resist the drifting sands. So general is the conviction that this sand blow is utterly irreclaimable that it has long since been abandoned to hopeless sterility. I shall be happily disappointed if my plan for utilizing it is not regarded by many farmers as visionary and impracticable. The feasibility of reclaiming the barren sands of Connecticut, even the wastes of Wallingford and North Haven, is proved by many facts. While agent of the Massachusetts State Board of Education I visited every town of that State,

and found thousands of acres in Plymouth and Barnstable counties—once sandy plains—covered with fine forests. The common pitch pine has there been most generally used for the reclamation of sand barrens. Recently the Scotch pine has been widely planted. The seeds were sometimes sowed broadcast, and sometimes dropped in furrows. The cost was trifling, and the profit has been satisfactory.

Hummel attributes the desolation of the Karst, the high plateau lying north of Trieste—until recently one of the most parched and barren districts in Europe—to the felling of its woods, centuries ago, to build the navies of Venice. The Austrian government is now making energetic, and thus far successful efforts for the reclamation of this desolate waste, having planted over half a million of young trees, and sown great quantities of seed. In the vicinity of Antwerp less than fifty years ago was a vast desolate plain. Looking to-day in the same direction from the spire of the cathedral, one can see nothing but a forest, whose limits seem lost in the horizon. Forest plantations have transformed those barren lands into fertile fields. French writers point with pride to an experiment begun eighty years ago on the very crest of a peninsula in Dauphiny, where stands a long stretch of fine forest, and where it had been confidently affirmed trees could not be made to grow.

On the Adriatic, Baltic, Mediterranean, Biscayan, and other coasts, the disastrous encroachments of the sea have been checked by forest plantations. Extensive plains, once barren sands south of Berlin, about Odessa and north of the Black Sea and vast steppes in Russia, are now well wooded. R. Douglass & Sons of Waukegan, Illinois, who have been the pioneers in promoting economic tree planting in the West, began four years ago the experiment of reclaiming barren sand ridges near the shore of Lake Michigan, trying pitch pine, white pine, Austrian pine, and Scotch pine. Here, as on Cape Cod, the Scotch pine proved the best for reclaiming sandy barrens. With these facts from abroad and at home it cannot be denied that even the poorest soils in Connecticut may be reclaimed. The *Pinus maritima*, which proved best

for the sandy soils in France, is not adapted to the climate of New England. It has been amply tried, and though growing rapidly for a season or two, is likely to winter-kill. But our native pitch pine, and still better the Scotch pine, are specially adapted to sandy barrens.

Daniel Webster planted many pines at Marshfield, and induced farmers in Plymouth and Barnstable counties to try the same experiment. This has been done very extensively by Mr. J. S. Fay, in Falmouth, near Wood's Hole. In visiting Falmouth I was happily impressed with the beauty and remarkable growth of his tree plantations. There, is a tract of over one hundred and twenty-five acres now densely covered with fine trees. When purchased by him, Mr. Fay says, "It was a barren waste, the soil dry and worn out. On a hundred acres there was not a tree of any kind, unless an oak sprang out from the huckleberry bushes here and there, but hardly lifting its head above them. Indeed, when I bought my place in 1853, except a few stunted cedars on Parker's Point and in the swamps, there was not an evergreen tree within three miles of my house, and hardly any tree of any kind in sight of it. It was maintained that trees could not be made to grow there. The seeds sown were of the native pitch pine with some white pine, the Austrian, Scotch, and Corsican pine, the Norway spruce, and the European larch—in all about thirty-five thousand imported plants, and many thousand native pines. As to the kinds which have done the best, the Scotch pine *from the seed*, including *prompt* germination, has proved the best grower, and very hardy. The Norway spruce and English oak have done well. The larch did not start well from the *seed*, but from the nursery or as imported it has grown remarkably. The hardy Scotch pine does finely either from the seed or the nursery. All these imported trees have done better than the native pitch pine. The larches are about forty feet high, and fourteen inches in diameter one foot from the ground. Some Scotch pines from seed sown in 1861, well situated and in good soil, are thirty feet high, and ten inches through, a foot from the ground. As to profits, one thing is sure. The land, originally

poor, has been enriched by the deposit of thousands of loads of leaves upon it, and by the shade afforded, while the soil has been lightened and lifted by the permeation of the roots of the trees; and though no present profit has been yet realized, (which already might have been by sales of the wood,) it should be considered as an investment for future results. Considering the position of my place, on a coast exposed to violent sea winds permeated with salt spray, the vigorous growth and promising appearance of my forest plantations are very encouraging to those more favorably placed. Not only may the destruction of our forests be partially remedied at a cheap cost, but the *waste* and *sterility* of our land by long cultivating be replaced with fertility by the simple process of nature."

The Scotch fir or pine, which Mr. Fay so highly commends, is a native of the Highlands, a hardy tree, and the most rapid grower of all the evergreens suited to our climate—the European larch, a still more rapid grower, being deciduous. It will thrive in the most dissimilar soils and on poorest sands where most other evergreens will not flourish, and makes an excellent wind-break. Its timber is not duly appreciated in this country. In England it is as highly prized as the best Baltic pine, and regarded as superior to our white pine for general purposes. While skeptical on this point, we must at least admit that it is harder, more durable, and more resinous than the white pine. It is light, stiff, and strong, freer from knots than any other fir, easily worked, and well adapted to all kinds of house carpentry. It is extensively used for masts and in naval architecture. In England it yields large quantities of tar, turpentine, and resin. Next to the larch it is the tree most commonly planted in Great Britain. It should be extensively used in Connecticut in reclaiming lands too poor for the larch. It proved a great success in the sandy wastes of Kincorth and Culbin in Scotland, which are now thriving forests.

Among the foresters of largest experience in Europe, I found the planting out system growing in favor, in place of sowing the seed, whether in furrows or broadcast in the fields where

the trees are to remain. If sowing is adopted, the land, except on sand barrens, must be well prepared. The general practice abroad is to sow the seed in beds, as beet or onion beds are prepared with us. The Germans speak of the seedlings while in the nursery beds as "in the school," and this phrase happily suggests how they should be treated. The aim is here to start, harden, and root the young plants in a small area where they can be sheltered with brush or otherwise from the scorching sun, and watered if need be in case of drought.

If the seedlings are to be put out close by the garden, they may be planted direct from the mother bed at the end of one or two years. But when they are to be removed to any distance or planted as forests, they should be *transplanted* at the end of the first or second year and planted for forests one year later. The larch and Scotch pine are usually planted permanently, two years from sowing in beds and one year from the planting, that is three years from the seed. The direction is constantly repeated to let the trees grow up *very thickly for a few years*, as they will at first thin themselves on the theory of the survival of the fittest, and after the fifth year the value of the poles will pay for the further thinning required. When planted, the rows should not be more than three feet apart, and the plants stand two feet apart in the rows, giving some seven thousand to the acre, varying with the kind of trees. At the outset the trees are planted more thickly in Europe than in America.

Will it pay the average farmer of Connecticut to plant trees? Certainly not if early profit is essential. The answer depends on various circumstances, such as the size of one's farm, its soil and situation. But in an ordinary Connecticut farm of from sixty to one hundred acres and upwards, I answer yes. If you are looking ahead and seeking an investment for future profit, "trees will make dollars, for they will grow in waste places where nothing else can be profitably cultivated. A soil too thin and rough for cereals may be favorable for trees. Hillsides and plains exhausted and worn out by the plow have often been reclaimed by planting forests. Ravines too steep for cultivation are the favorite seats of timber, and

wherever a crevice is found in a rocky ledge, the root of a tree will burrow and spread, taking a hold so firm as to defy the storm, and acting mechanically to disintegrate the rock and change its constituent elements into useful products. By the road-side, the river-bank, along the brook, and on the overhanging cliff, a tree may be always earning wealth for its owners, both in our densest settlements and in the waste places of our most valuable lands." In no way can we ultimately enrich Connecticut more than by planting the choicest trees on our exhausted and unproductive lands. In such situations forests will yield a large percentage of profit. This is a duty we owe to ourselves and to our children.

In many positions forests are of great service as wind-breaks; even narrow strips of trees afford a needful shelter to fruit trees and to various crops, as well as a shield to cattle from piercing winds. Evergreens serve best for screens, as deciduous trees are leafless when their shelter is most needed, especially for stock and around farm buildings. The evergreens most suitable for this purpose are the Norway spruce, white pine, Scotch pine, and Austrian pine; and next to these are the American arbor vitæ, hemlock, and spruce. Sheltered orchards are most productive and less likely to lose their fruit prematurely by violent winds, and the farmer with proper wind-screens consumes less fuel in his house and less forage in his stables. Stated in the order of their obvious advantage to individual farmers, the benefits of tree-planting would be, first, direct profit in timber and fuel; second, the reclamation of waste land; third, shelter; fourth, climatic gain and hygienic influence; and fifth, ornamentation.

The climatic influence of forests has been of late the subject of extensive investigation in Europe, and much evidence gathered showing that forest denudation may result in detriment to the health and welfare of a community. The influence of forests on rainfall, climate, and water supply, has been freely discussed in the schools of forestry and in scientific circles. It is not proved that extensive denudation will cause a marked decrease in the *total* rainfall of any large country. While this is still an unsettled question, recent observations in France,

made with great care and complete sets of instruments at different stations, seem to establish the facts, first, that throughout the year six per cent. more rain falls in the forests than in the open fields; second, that of the total rainfall ten per cent. in the forest is caught by the leaves and reaches the earth very gradually, or not at all; and, third, that the evaporation in the open country is five times as great as in a forest.

But on the question of the influence of forests on climate and the *permanent* water supply, there is a growing unanimity among practical foresters and professors in the forest schools of Europe. Their theories and observations plainly show that the wholesale clearing of forests has an injurious effect on both, while the extensive planting of trees on arid regions has ameliorated the climate, prevented mountain torrents, and rendered the water supply more permanent. These investigations show that the general destruction of forests has rendered the climate dryer, more changeable and trying, and that forests on the one hand tend to lower the general temperature of a country and promote the fall of rain at more *regular* intervals, and on the other hand they ward off *sudden* meteorological changes which result in heavy falls of rain and disastrous floods.

It is well known that houses too closely surrounded by trees are damp. Beautiful and healthful as shade trees are, they may stand too near the house. Dense evergreens growing so close as to shut out all sunlight, are harmful. It is an old Italian proverb, that "where the sunlight cannot come the doctor must;" and sometimes the wisest direction of the physician to his rheumatic patient is, to cut down the tree which too densely overshadows the house and excludes all sunlight. The wetness of roads completely overshadowed by trees, shows how forests affect the humidity of the ground they cover. Mr. Marsh says: "One important conclusion at least is certain and undisputed, that within their own limits and near their own borders forests maintain a more uniform degree of humidity in the atmosphere than is observed in cleared grounds." Speaking of the indiscriminate clearing in

America, he says: "with the disappearance of the forest, all is changed. At one season, the earth parts with its warmth by radiation to an open sky, and at another receives heat from the unobstructed rays of the sun; hence the climate becomes excessive, and the soil is alternately parched by the fervor of summer and seared by the rigors of winter."

Wm. Cullen Bryant says: "Our summers are becoming dryer and our streams smaller. Take the Cuyahoga as an illustration. Fifty years ago large barges loaded with goods went up and down that river. Now, in an ordinary stage of the water, a canoe or skiff can hardly pass down the stream. And from the same cause—the destruction of our forests—other streams are drying up in summer." Almost every work on forestry abounds in evidence that extensive forest denudation has everywhere diminished the flow of springs. The case of the famous spring in the Island of Ascension is often cited, which dried up when the adjacent mountain was cleared, but reappeared in a few years after the wood was replanted. Several lakes in Switzerland showed a depression of their level after a general devastation of the forests. Siemoni says: "In a rocky nook in the Tuscan Apennines there flowed a perennial stream from three adjacent springs. On the disappearance of the woods around and above the springs the stream ceased, except in rainy weather, but when a new growth of wood again shaded the soil, the springs began to flow." Marchand says: "The river that from time immemorial furnished ample water-power for the factory at St. Ursanne dwindled so much when the surrounding woods were cut that the factory was at last obliged to stop altogether." President Chadbourne says that Salt Lake contains nearly twice as much water as it did when the Mormons came, and that the water supply is increasing throughout the territory, not by an increase of rain, but cultivation and extensive groves of trees have checked the influence of drying winds and lessened evaporation.*

* Near my residence (Woburn, Massachusetts,) there is a pond upon which mills have been standing since the early settlement of the town. These have been kept in constant operation until within thirty years, when the supply of water began to fail. The pond owes its existence to a stream which has its source in the hills stretching some miles to the south. Within the time mentioned,

I visited the planted forests of the Duke of Athole—whose estates, beginning near Dunkeld in Scotland, extend forty miles by ten—in company with Captain Campbell Walker, now the Conservator of State Forests in New Zealand, who was long employed in the same service in India. He said he had personally observed the drying up of springs and decrease of the *average* amount of water in some of the mountain forests in India, in which extensive clearing had taken place, and that such clearing had unquestionably lessened the *regular* supply for springs and permanent flow in the streams and rivers. While I was in England, the terrible famine in India resulting in the starvation of over seven hundred and fifty thousand people—more than the entire population of Connecticut and Rhode Island—was a prominent theme of public thought and talk and sympathy. Captain Walker, Dr. J. C. Brown, and other foresters expressed the view that forest denudation, diminishing the springs and lessening the former sources of artificial irrigation, was the leading cause of this terrible calamity. Under the early rule of the East India Company, there was a wide-spread devastation of the forests, and in later years the construction of extensive railway and telegraph lines have created a new demand for timber. Recently the English Government has adopted energetic measures for re-foresting the mountains, and placed the remaining forests under the supervision of competent foresters.

In a paper read to the Vienna Geographical Society in 1875, Herr Wex, Counsellor of State, and Director of the Government Works for the regulation of the flow of the Danube, affirms that in the last fifty years the decrease in the average level or comparison of the highest and lowest flow of the Elbe and Oder has been seventeen inches, the Rhine twenty-four, Vistula twenty-six, Danube at Orsova, fifty-five. These measurements, embracing the greatest flood

---

these hills, which were clothed with a dense forest, have been stripped of trees, and what was never heard of before, the stream itself has been entirely dry. Within the last ten years a new growth of wood has sprung up on the land formerly occupied by the old forest, and now the water runs through the year. DR. PIPER—*Trees of America.*

heights, the lowest flow, and the medium average flow, show that the *floods* are unquestionably higher than in former years, and the contrast between the highest and lowest flow is greater, and that these higher floods are no compensation for the diminution of the medium and low flood, and that many manufactories built during the last fifty years have experienced a marked diminution in the water supply of their streams, and steam-engines have been employed to meet the deficiency of water-power, once ample to do the same work.

The cause of this remarkable phenomena lies in the extensive clearing away of the forests, especially in the mountains, where deluges of rain occur more frequently; for, in lands devoid of trees, the rain water sinks less into the soil, but more speedily reaches the brooks, streams, and rivers, and fills and overflows these water-courses, and results in disastrous floods. The correctness of this conclusion is sadly attested by the now frequently recurring inundations in Italy, in the south of France, Hungary, Bohemia, and in many other lands. It may be worthy of inquiry whether the general clearing of the mountain forests around Salisbury, Connecticut, to meet the growing demand for charcoal for the furnaces, had any connection with the desolating flood which occurred in that town four years ago. A resident of Salisbury, whose farm lies near the base of the mountain skirting that town, says that a stream on his land, formerly never failing, has dried up every summer for the last twenty years.

By several learned societies—like the Royal Academy of Science of Vienna, and the Imperial Academy of Science of St. Petersburg—commissioners were appointed to report upon the paper of Wex, and their reports substantially confirm his views, and say: "Forests exercise a beneficial influence which can hardly be estimated too highly in an increased humidity of the air, a reduction of the extremes of temperature, a diminution of evaporation, and a more *regular* distribution of the rainfall, while the injurious effects of their destruction is seen in an alternation of periods of drought at one time with wasting floods at another." The forests serve as storehouses of moisture, both from their leafy canopy which shuts out the

sun, and the myriads, or rather millions, of leaves covering the soil and acting like a sponge, soaking up and retaining the rain and regulating its distribution, while the roots act as vertical drains, favoring infiltration and promoting the descent of the water into the lower strata of the earth, there to nourish the springs.

Among the works of Dr. J. C. Brown on Forestry—the most voluminous writer on this subject in the English language—is one on "*Reboisement* in France," or the replanting of the Alps, the Cevennes, and the Pyrenees, to arrest and prevent the destructive consequences of torrents. He clearly shows from official documents what fearful inundations resulted from the over-clearing of forests, and describes the remedial measures now in progress, which are to extend through many years and to cost over twelve millions of francs. But the loss of property by the terrible inundations in the south of France in 1875 was estimated by the *government* at seventy-five millions of francs, besides the loss of over three thousand lives. This was the work of a single year. The sad lessons of other torrents and other years have now at length led to systematic efforts to re-clothe their mountains.

The benefits that may accrue to our country from the discussion of tree-planting, were strikingly exhibited two hundred and fourteen years ago, when Sir John Evelyn published his celebrated work, entitled, "Sylva; or, a Discourse on Forest Trees and the Propagation of Timber." It was at once received with great public favor, and honored with royal commendation. He had remarkable success in awakening general interest in sylviculture. It was written while he was employed in an entirely different branch of public service, but, as he says, "from an earnest desire to support the credit of the Royal Society, and to convince the world that philosophy was not barely an amusement, fit only to employ the time of melancholy and speculative people, but a high and useful science, worthy the attention of men of the greatest parts, and capable of contributing in a supreme degree to the welfare of the nation." He was one of the founders of the Royal Society, and wrote this book at its special request, and that society

has originated few books in the last two hundred years more useful than this which still survives in its grand results, although his other works on painting, sculpture, architecture, and medals have long since been forgotten. In many ways England has recognized her great obligations to the man who worked so lovingly and effectively for the good of his countrymen.

Disraeli, in his "Curiosities of Literature," fittingly says: "Had Evelyn only composed the great work of his Sylva, his name would have excited the gratitude of posterity. The voice of the patriot exults in the dedication to Charles II, prefixed to one of the later editions, in which he says: 'I need not acquaint your Majesty how many millions of *timber* trees, besides infinite others, have been planted throughout your vast dominions at the instigation of this work, because your Majesty has been pleased to own it publicly for my encouragement.' Surely, while Britain retains her situation among the nations of Europe, the Sylva of Evelyn will endure with her triumphant oaks. It was a retired philosopher who aroused the genius of the nation, and who, casting a prophetic eye towards the age in which we live, contributed to secure our sovereignty of the seas. The present navy of Great Britain has been constructed with the oaks which the genius of John Evelyn planted."

What trees shall we plant in Connecticut? One of the most valuable of our native trees is the white ash, and, all things considered, it is one of the most profitable for planting. Combining lightness, strength, toughness, elasticity, and beauty of grain in a rare degree, it is in great and growing demand for farming tools, furniture, interior finishing of houses and railroad cars, the construction of carriages, for oars and pulley-blocks, and many other purposes. The excellence of our ash is one secret of the preference given abroad to American agricultural implements. It is hardy, will bear the bleakest exposure, is a rapid grower, and attains large size, but will not thrive on poor lands. It is every way superior to the European ash, much as that has been cultivated and lauded abroad. It is now found widely in the nurseries

the remainder being imported from Great Britain, France, Holland, and Belgium, at an annual cost of five millions of dollars. The osier proper, the product of *Salix viminalis* and its allies, can be grown without trouble in any wet, undrained soil, capable of producing little else of value; but the better sorts of basket willow are only successfully produced with careful cultivation on rich, well-drained soil. Under such conditions it is a profitable crop, capable of netting at least $150 a year to the acre, and well worth the attention of our farmers." The experiment of raising willows is worth trying, though I do not anticipate so large profits as Professor Sargent promises.

For the reclamation of our pastures and waste lands abandoned to hard-hack, sumac, and other worthless brush, the European larch deserves to become a favorite. A native of the Alps, Apennines, of the Tyrol and Carpathian Mountains, it is a very hardy tree, and at home in a variety of well-drained soils, especially on rough, rocky, or gravelly ground, and the most rugged ravines. There are in our State large tracts of bleak hill-sides and mountain declivities or summits, now practically worthless, where the larch, thickly planted, would soon choke out brush, weeds, and grasses. As an ornamental tree it grows finely even in deep and rich loam, but its extraordinary qualities for timber may be impaired when grown on the rich prairies of the West or the best lands of the East. When raised under right conditions it combines the two qualities of rapidity of growth and durability of wood more than any other tree. This wood was in high favor with the Romans for the building of ships and bridges. Julius Cæsar spoke strongly of its strength and durability.

Last summer I heard a lumber-man in Venice say that its durability was amply attested there, as most of the houses of the city are built upon larch piles, many of which, though in use for centuries, show no signs of decay. In a large Doge's palace, now used as a hotel, he showed me some very ancient larch window-casings which are still sound. For gondola posts in the canals adjoining the houses the larch is preferred. In wharves and many other positions in England where there

is an alternation of wet and dry with the tide, the larch has stood this most trying test far better than oak. In England it is regarded as the best timber for railway ties. Monville says: "In Switzerland, the larch, as the most durable of woods, is preferred for shingles, fences, and vine-props. These vine-props remain fixed for years, and see crop after crop of vines bear their fruit and perish without showing any symptoms of decay. Props of silver fir would not last more than ten years." Evelyn says: "It makes everlasting spouts and pent-houses, which need neither pitch nor painting to preserve them." Michie affirms that "For out-door work it is the most durable of all descriptions of wood. I have known larch posts that have stood for nearly fifty years." Professor Sargent expresses the opinion that "For posts it will equal in durability our red cedar, while in the power to hold nails it is greatly its superior." The chestnut railway sleeper loses its power to hold iron in about seven years, though the tie itself may not so soon seriously rot. The larch, while it holds iron as firmly as oak, unlike the latter, does not corrode iron.

The Boston & Albany Railway have larch ties in use for sixteen years which are still sound. The president of the Illinois Central Railway, having examined the vast planted forests of larch in Europe and learned its remarkable fitness for railway ties, offers to transport the young plants free of charge to any point on their lines or leased lines, provided they are to be planted in the vicinity of the same. It is, however, an experiment which time alone can determine, whether the larch will retain its durability when planted in the level, deep, vegetable mould of the prairies, with their retentive sub-soil. That it will grow there rapidly and luxuriantly is amply proved, but its history for many centuries shows that elevated lands suit it better than low grounds, and side-hills and mountain slopes better than flats. In the rich river flats of Kew Gardens and in the vicinity of London the larch does not thrive. The specimens found in that remarkable collection of all known trees are puny. The Kew arborist informed me that in the two hundred and seventy acres appropriated to the arboretum, no spot had been found suited to the larch. Mr. James Brown,

an experienced forester of Scotland, attributes the disease, which has of late prevailed in many larch plantations in that country, to planting it, both in the nursery and the field, in uncongenial soil.

No other tree has been planted so extensively in Scotland. It attains maturity long before the oak, and serves well for nearly all purposes for which oak is used. Larch trees thirty years old are sometimes sold for fifteen dollars each, while oaks of the same age are not worth three dollars each. According to Newlands the strength of larch timber is to that of British oak as 103 to 100; its stiffness as 79 to 100; while its toughness is as 134 to 100. As the larch grows erect, with short and slender laterals, it may be planted much thicker than the oak. According to Loudon ten acres of larch will furnish as much ship timber as seventy-five acres of oak. Its large timber yield per acre is one source of its popularity in Britain. It was first planted on the estate of the Duke of Athole, in 1741. Some stately specimens over one hundred and thirty years old may be seen near the cathedral at Dunkeld. Mr. McGregor, the duke's forester, informed me that on this one estate have been planted over twenty-seven millions of larch trees, covering over sixteen thousand acres, some of which was formerly worth only from one to two shillings per acre.

Dr. James Brown says he has seen matured crops of larch of sixty-five years' standing sold for from $750 to $2,000 per acre, when the land was originally worth only from $2 to $4 per acre. Mr. Sargent, director of the Botanic Garden and Arboretum of Harvard College, gives a detailed estimate of the profits of a plantation of European larch of ten acres to last fifty years, calculating the cost for land, fencing, plants, labor, taxes, and interest, and makes the net gain to be $52,282.75, or about thirteen per cent. per annum for the entire fifty years, after retaining the original capital, and he adds: "There are in Massachusetts fully 200,000 acres of unimproved land which could, with advantage, be at once covered with larch plantations, and if so planted their net yield, according to my estimate, in fifty years would be

$1,045,660,000. Supposing that these 200,000 acres will, in the natural course of events, produce, during the same time, one hundred cords of fire-wood to the acre, worth six dollars a cord, amounting to $120,000,000, and subtracting this sum from the net yield of the larch, we have left, as created wealth, the respectable sum of $925,000,000."

Mr. Sargent, however, admits that this is farming *on paper*, and that considerable allowances should be made for such contingencies as fire, tree diseases, insect attacks, and other dangers now unforeseen. Robert Douglas of Illinois, who has had far more experience in larch planting than any other American, writes me that the larch in this country is remarkably free from all disease and insect depredations.

My special aim has been to encourage the recuperation of sterile lands by tree planting. The experiments of thus reclaiming barren tracts, which have been tried on a large scale in many European countries, prove the superiority of the larch for this purpose over all other evergreens, because it is deciduous. Grigor says: "No tree is so valuable as the larch in its fertilizing effects, arising from the richness of its foliage, which it sheds *annually*. The yearly deposit is very great; the leaves remain and are consumed on the spot where they drop." Trees also enrich the soil by a curious chemistry which disintegrates even the rocks, and transmutes their particles into forms of life and beauty. The radicles and rootlets, in their underground laboratory, secrete acids which dissolve the very sands and stones.

The frequency of forest fires is urged as an objection to tree-planting. Here is a real discouragement; but forests are no more likely to be burned than are our barns and dwellings. More property is consumed every year by the burning of stores and houses in this country than by forest fires. This danger, therefore, should no more prevent tree-planting than house-building. But such views need to be spread among all classes of the American people as will produce the general conviction that the interests of all classes are concerned in the protection and conservation of forests. The schools of forestry have made this sentiment wellnigh universal in

Germany, and all classes there appreciate their value and the need of protecting them. Browsing and pasturage in certain limits are prohibited, and yet the forests are not fenced. Simple marks designate where cattle may pasture and where they may not, and an intelligent public sentiment is a better guardian of the national or communal forests than official watchers or national police.

In some portions of Germany the law formerly required every landholder to plant trees along his road frontage. Happy would it be for us if the sovereigns of our soil would make each such a law for himself. Happy, also, if the law of usage, fashion, or interest here, as did the civil law there, required that every young man before he married should plant a tree. In some of our Western States tree-planting by the road-side is encouraged by a bounty from the State treasury, and in the fields by both a bounty and exemption from taxation for a term of years. The law in Minnesota provides that "every person planting, protecting and cultivating forest trees for three years, one-half mile or more along any public highway, shall be entitled to receive for ten years thereafter an annual bounty of two dollars for each half-mile so planted and cultivated, to be paid out of the State treasury; but such bounty shall not be paid any longer than such line of trees is maintained." If I may be pardoned for repeating a personal allusion, the maples which I planted, when a mere boy, before the old homestead in Litchfield county, are now beautiful and stately trees. As I have often said, they have paid me a thousand-fold for the work they cost, and added new charms to that beautiful spot, to which I count it a privilege to make an annual visit. Among the memories of my boyhood, no day has recurred with such frequency and satisfaction as that then devoted to tree-planting. My interest in the subject is due to this incident (or perhaps accident) of my boyhood. I should be thankful if I could help put a similar incident, and an equally grateful experience, into the childhood of our boys of to-day. In this good work may I earnestly bespeak the coöperation of the farmers of Connecticut.

In tree-planting, the economic and ornamental touch at so

many points that the cases are rare where they really diverge. Nothing, for example, can add so much to the beauty and attractiveness of our country roads as long avenues of fine trees. I saw this beautifully illustrated in France, last summer, where, for over a hundred miles on a stretch, the road was lined with trees. In many ways the first Napoleon's interest in arboriculture proved a benefaction to France. No time should be lost in securing the same grand attraction to the highways of Connecticut. Growing on land otherwise running to waste, such trees would yield most satisfactory returns. The shade and beauty would be grateful to every traveler, but doubly so to the owner and the planter, as the happy experience of many Connecticut farmers can testify. A grand work in this direction is already well started. No class can contribute so much to the adornment of our public roads as the farmers. They have already in abundance the very best trees for the roadside, such as the elm, maple, ash, American linden (or bass), oak, and in some localities the walnut. The hard maple will thrive in dry and gravelly soils, while the elm and red maple are specially desirable for moist, low ground. As the maples should be planted twenty-five feet apart, and the elms from forty to fifty, poplars or willows or trees growing rapidly from scions, may be placed between, to be cut down when their statelier neighbors require the room for their full development.

Tree-planting is fitted to give a needful lesson of forethought to the juvenile mind. Living only in the present and for the present, too often youth will sow only where they can quickly reap. A meager crop soon in hand, outweighs a golden harvest long in maturing. Youth should learn to forecast the future as the condition of wisdom. Arboriculture is a discipline in foresight—it is always planting for the future, and sometimes for the distant future. Says Washington Irving, "There is something nobly simple and pure in such a taste for trees. It argues a sweet and generous nature to have this strong friendship for the hardy and glorious sons of the forest. There is a serene majesty in woodland scenery that enters into the soul, dilates and elevates it, and fills it

with noble inclinations. There is a grandeur of thought connected with this heroic line of husbandry. It is worthy of liberal and free-born and aspiring men. He who plants an oak, looks forward to future ages and plants for posterity. He cannot expect to enjoy its shelter, but he exults in the idea that the acorn which he has buried in the earth shall grow up into a lofty pile, and shall keep on flourishing and increasing and benefiting mankind long after he has ceased to tread his paternal fields." It was the trees of his own planting at Sunnyside-on-the-Hudson, more than the beauty of the surrounding landscape, that led Irving to say, "After all my wanderings, I return to this spot with a heartfelt preference for it over all others in the world." It was the simple beauty he had created at Marshfield,—the grassy lawns, the shaded approaches, the hundreds of trees of his planting,—that bound Daniel Webster so strongly to that sequestered spot. The charm of Abbotsford, the grand Mecca of Scotland, comes mainly from its beautiful ivy and shrubbery and the thousands of trees planted by the hand of its illustrious proprietor. Says Sir Walter Scott, "My heart clings to this place I have created. There is scarce a tree in it that does not owe its being to me. Once well planted, a tree will grow when you are sleeping, and it is almost the only thing that needs no tending."

Any wealthy citizens of Connecticut, who desire to become public benefactors, can hardly find a more inviting field for their liberality than by offering prizes for sylviculture. A few thousand dollars placed in the hands of the Connecticut Board of Agriculture would widely stimulate tree-planting, and greatly enrich the State. The Massachusetts Society for Promoting Agriculture, offer three thousand dollars in the following prizes:

First. For the best plantation of not less than five acres, $1,000; for the next best, $600; and for the next best, $400. For these prizes the European larch must be planted, except in Barnstable, Dukes, and Nantucket counties, where the Scotch pine or Corsican pine must be used, as best adapted to sandy plains. Only plantations made on poor, worn-out

land, or that which is unfit for agricultural purposes, and containing at least 2,700 trees to the acre, can compete for these prizes.

Second. For the best plantation of American white ash, of not less than five acres in extent, $600; for the next best, $400. Plantations originally of less than 5,000 trees to the acre, cannot compete for these prizes.

The following directions for tree-planting are condensed from the recommendations given by the trustees of the prize fund. For planting larch and pine, shallow furrows four feet apart should be run one way across the field. Then by planting in the furrows four feet apart each way, 2,720 plants will be required to the acre. On hilly, rocky land which cannot be plowed, it will be only necessary to open with a spade, holes large enough to admit the roots of the plants. *The larch must be planted as early in the season as the ground can be worked.* No other tree begins to grow so early, and too late planting is a common cause of failure. The Scotch and Corsican pines can be planted up to the first of May. The roots should be exposed to the wind and sun as little as possible. Carelessness in this particular is often fatal to the young plants. The trees should be carried to the field in bundles, covered with wet mats, and not be removed till they are required for planting. The roots should be carefully spread out in the holes or furrows prepared for them, and the soil worked among them with the hand, and finally pressed down with the foot. A cloudy or rainy day is especially favorable for this work. All young plantations *must be protected* from browsing animals, the greatest enemies, next to man, to young trees and the spread of forest growth.

If the New York, New Haven & Hartford Railroad reclaim the strip of land bordering their line through the "sand-blow," the example would be a benefaction to the State as a demonstration of what may be accomplished under the most unfavorable circumstances. If that desert can be reclaimed, surely all other barrens in Connecticut may be fertilized by forests. This enterprise will require time, faith, patience, and money. For the first four years the young trees may seem

to barely struggle between life and death, after which they are likely to grow rapidly. As this scheme will be regarded as chimerical by those who have not investigated the subject, I give below extracts from letters which I have received from practical tree-planters on Cape Cod and elsewhere, embodying interesting facts and practical suggestions.

John Doane, Orleans. (Mr. Doane, now eighty-six years of age, is the oldest living sylviculturist in Barnstable County.) I have planted one hundred acres in Orleans and seventy in Brewster. The whole plantation in Orleans is about five hundred acres; in Eastham seven hundred acres; in Wellfleet four hundred; in Truro six hundred; in Chatham, Harwich, Dennis, and Yarmouth, about four hundred each; and in Barnstable six hundred acres. In regard to the other towns on Cape Cod I have no definite information, though trees have been planted in many towns on the Cape. I have made a machine for planting the seed, that I have lent to the tree-planters in five of the neighboring towns. The land I have planted with pines was not worth over fifty cents per acre before planting, and I have sold some since covered with young pines, for fourteen dollars per acre. I consider it a good investment.

John Kenrick, South Orleans.--My experiments in tree-planting have been made on over a hundred acres now covered with trees from one to thirty-five years old, chiefly pitch pine. I am now trying Scotch and Corsican pine, and European larch. My first aim has been to cover my worn-out lands with beauty and verdure, and it has proved a successful and economic experiment. The seed of the pitch pine is worth from one to two dollars a pound, the higher price being in the end the cheapest. Fresh seeds, *carefully gathered*, are as sure to vegetate as corn, but obtained from seedsmen, they are very unreliable in germinating. European nurserymen take far greater pains in gathering forest tree seeds, and understand the art of curing them better than Americans. I have tried every method of tree planting, transplanting trees from the smallest to those that are two feet high. This is a costly plan, but may be adopted when one wishes to save time, and desires a few trees as a wind break or otherwise. In transplanting trees *immediately* from my own nursery to the field, my favorite time is just as the buds begin to start in the spring. I have planted seeds both with a planter and by hand. On our light sands a man and boy will plant three acres in a day. Dropping six seeds in a hill, it will take about half a pound of seed to the acre. This is my favorite method, and is more satisfactory in results, though more costly than that of using the plow and planter. When the evergreens are about two feet high I would thin them, leaving one thrifty plant in each hill. I do not trim till they get large, and then cut off only the dead branches.

Tully Crosby, Brewster. In our small town about fifteen hundred acres of old waste land have been planted with pitch-pine. The Norway pine has not proved a success with us. Many old fields bought for fifty cents per acre, and planted with pine twenty-five years ago, are now worth from ten to twenty dollars an acre. The pines grow well for twenty-five or thirty years, and when cut off a second crop springs up immediately, and this crop does better than the first. The pitch-pine takes root and grows *on our barren beach sand where no soil is perceptible.* Our people are now planting trees every year. I have recently planted twelve acres. Two years ago I cut off a lot planted thirty years since, and the land is now full of young pine trees growing from the seed scattered by the first growth. A man with a two-horse team can plant ten acres in a day, and three pounds of seed will do the whole.

E. Higgins, Eastham. Thirty years ago twenty acres of condemned tillage land, worth one dollar per acre, was planted with pitch pine. The present value of this land is fifteen dollars per acre. Prior to 1870, two hundred and twenty-five acres more of the same sort of land was thus planted, the present value of

which is eight dollars per acre. About one hundred and fifty acres of *sandy* land, utterly barren and not worth fifty cents to the acre, have been planted, the present value of which is seven dollars per acre.

John G. Thompson, North Truro. About six hundred and fifty acres have been planted in this town. The price of pitch-pine seed for the last few years has been one dollar and fifty cents per pound. Thirty years ago land in this town could be bought for twenty-five cents per acre for tree-planting; now the same kind of barren land sells for two dollars per acre for tree-planting. I find the expense of planting the pines to be two dollars and twenty-five cents per acre.

S. B. Phinney, Barnstable. Large tracts of worn-out lands in this county, that were worth comparatively nothing, have been planted from the seed of the pitch-pine. These experiments have proved successful. I know of no way in which the light sandy lands in this section can be made so valuable as by planting them with the pitch-pine. Our experience proves that the cultivation of forest trees is feasible and profitable in New England seaport towns. In 1845 I planted in this town a ten-acre lot with pitch-pine seed, much as corn is planted, dropping three seeds in a hill and covering them with half an inch of soil. To-day many of these trees will girth more than a man's body. Hundreds of acres in this section are being planted annually.

J. E. Crane, Bridgewater. The most profitable tree we have planted in this region is the white pine, with which about two hundred acres have been planted on old worn-out pasture and light sandy soil. The cost of planting, that is, *setting out young trees* twelve to eighteen inches high, is about eight dollars per acre. Properly set out, scarcely one in fifty will fail. There is in this vicinity an acre that was set out thirty-five years ago, that has just yielded in cash for the *wood and lumber*, $350. On another acre, planted twenty-eight years ago, there is estimated to be from eighty to one hundred cords. These are unusual specimens, but fifty cords per acre in twenty-five years, is a low estimate on land natural to pine, and pine is the most valuable growth of wood in the Old Colony.

F. Collamore, Pembroke. Forty years since, Hon. Morrill Allen, "the model farmer" of Plymouth county, planted white pines which grew rapidly, and have proved very valuable for the manufacture of wooden packing-boxes. His example has been followed to a limited extent. Every one believes in the profit of it, but we are in a well-wooded region, and when a lot is cut off it soon starts up again.

Robert Douglas and Sons, Waukegan, Illinois. We have propagated the European larch for nearly twenty years. For a number of years, and until the financial collapse, we sowed over *one thousand pounds of larch seeds* annually, averaging five to seven thousand plants to the pound of seed. The larch grows finely and rapidly in the New England States, in northern Illinois, Iowa, Minnesota, and Wisconsin. It grows nearly as fast, and makes more durable timber on poor lands than on very rich lands. There is no land so poor, except blowing sands, but that it will make a rapid growth after it is once fairly established. It is a tree adapted to a northern climate, and does not thrive in Kansas, southern Illinois, and south of Pennsylvania. We are growing the native cherry (*Cerasus serotina*) in large quantities, as it is healthy, transplants well, grows rapidly on land far from rich, and the timber is very valuable. We will send our catalogues, giving fuller information, to any party in Connecticut on application. The European larch should be planted as early as possible in the spring. It should never be planted on low wet ground. Set out early, no tree will bear transplanting better. Scotch pine and larch do well mixed. We recommend planting a few rows of the admixture on the margin of the plantation. When planted four feet by four, as we advise, they can be worked both ways with the cultivator for two or three years, when the branches will shade the ground so densely as to destroy the undergrowth. When the trees are received from the nursery, the boxes should be immediately unpacked and the *roots* dipped into a puddle made of rich, mellow soil about the thickness of paint, and kept in a shaded place till ready to plant, but the tops should be kept dry. Set the trees a little deeper than they stood in the nursery. After treading the earth firmly about the roots, draw a little loose earth up to the trees to prevent the surface from baking.

Francis Skinner, Brookline, a Trustee of Massachusetts Society for Promoting Agriculture. I will receive and transmit orders for any number of trees for plantations in Connecticut to Douglas & Sons, Waukegan, Illinois. By arrangement with them, such orders transmitted through you are subject to fifteen per cent. discount from the catalogue prices, and such orders can be transmitted up to April 1st, except for European larch, for which the closing time will be March 1st. We are filling our Massachusetts orders from Douglas & Sons in preference to importing from England, as they are cheaper when ordered in large quantities, and the chances of their success far greater. American white ash, one or two years old and about one foot high, are from $3 to $5.50 per thousand; European larch from $4 to $8 per thousand. As this duty is undertaken solely from a desire to facilitate tree-planting, and not for the purpose of any personal gain, I cannot be held responsible in any way for the results.

A. W. Holley, Salisbury, Conn.—The consumption of wood in this and surrounding towns has been very great in supplying charcoal to our numerous iron works. Some of the mountains have been stripped of their trees three times within the last century. The second growth was rapid. Each subsequent one has been less vigorous and less rapid. Other varieties, aided by artificial means, such as seeding, placing cuttings, or transplanting the young trees, might soon render our mountains valuable again for the production of forests. Our landowners have not paid sufficient attention to the propagation of trees. The denudation of the mountains in Salisbury have lessened our streams. In the season of rain there is a more rapid rise and a greater flood than formerly when the forests were standing and the foliage and falling limbs lay quietly covering the earth beneath. Many smaller streams which flowed continuously through the entire season forty or fifty years ago, fail altogether in the summer, and the larger ones are proportionately diminished. Your suggestions in regard to fertilizing our sandy plains are practical, and should be carried out.

Experiments are now in progress to fix the dunes or sand hills which threaten the Suez Canal, by planting the maritime pine and other trees. Last summer I visited the celebrated forest of Fontainbleau, in France, which covers an area of sixty-four square miles. The soil of this wide tract is composed almost entirely of sand, and apparently as dry as the sand plains of Wallingford. Jules Claré, a student of forest science of world-wide fame, says: "The sand here forms ninety-eight per cent. of the earth, and it is almost without water; it would be a drifting desert but for the trees growing and artificially propagated upon it." What has been done with signal success at Fontainbleau shows the practicability of reclaiming the worst deserts that can be found in our State. Many other facts might be cited were it necessary, both from home and foreign fields, to prove the feasibility of this plan of reclaiming sterile lands. If one is to be commended who makes two blades of grass grow where but one grew before, how much more the farmer who makes forests thrive where nothing now grows.

SCHOOLS OF FORESTRY.

The experience of Europe long since demonstrated the value and necessity of "Forest Schools" so numerous on the Continent. As these institutions are unknown in this country, a detailed statement of their aims and character will not only be of interest, but I hope, will help towards the organization of similar schools in America. In connection with either of our Colleges, the endowment of two additional professorships, or even one at the outset, might inaugurate a Department of Forestry. As the applied mathematics and the sciences comprise so large a part of the curriculum of Forest Schools, a Forest Department could very easily and economically be annexed to the Sheffield Scientific School, where the existing cabinets, laboratories and philosophical apparatus could be utilized in forestral instruction. The endowment of such a department would prove a great benefaction to the State and to the country, opening new fields of investigation which would bear directly on the ultimate resources and permanent prosperity of the nation. The conclusions of foreign foresters, though confirmed by the broadest observations and experience in Europe, cannot all be wisely adopted in American Sylviculture. Difference in soil, climate and other conditions, may affect trees in regard to their rapidity of growth, health, durability of timber, texture, elasticity and grain of the wood, and many other qualities. These vital questions can be determined only by careful investigations carried on in each country. The Lombardy poplar, for example, sending out its almost upright laterals from the very ground all along its tall stem, grows beautifully in Italy, and is still a favorite with the Italians as of old with the Romans, who, it is said, gave it the name *arbor populi*. But in New England so many of its branches winterkill that it soon becomes an unsightly collection of dead limbs.

Another object of my recent visit to the leading schools of Forestry in Europe was to gather the practical plans and suggestions embodied in my paper on "Economic Tree Planting," first published in the Report of the Connecticut Board of Agriculture, and thus help reclaim our ex-

hausted lands by tree planting. As these lands have been abandoned to hopeless sterility, and their reclamation has already been pronounced a visionary and impracticable scheme, I have shown that the experiment of reclaiming vast barrens in France, Germany, Russia, Austria and other European countries, has been tried with conspicuous success. What has been done on so broad a scale and with such grand results in Europe surely can be accomplished in the comparatively narrow barrens of the New England States.

Another purpose of my journey was to do something towards making our youth practical arborists by awakening a love of trees and an interest in their study and culture. From a wide field of observation, I tried to collect such facts as seem fitted to further the work of rural adornment, in which encouraging progress has already been made in our State. A few oral lessons in our schools on rural art, and especially on the beauty, variety and value of trees and the ease and ways of their propagation, would be as good seed sown in good ground bringing forth fruit an hundred fold. Very little time would be required for those school talks which would be sure to inspire an interest in the study and culture of trees, and in the broader subject of rural art and adornment. To all of the teachers of Connecticut inclined to give such instruction in their schools my "Economic Tree Planting" will be sent without charge, at least so long as the thousand copies printed for that purpose may last.

The planting of the Syrian Willow, the supply of which fell far short of the demand, was designed as a *mere beginning*, sure to lead to something more and better, and to interest our teachers and youth in the broad subject of tree-planting. Beautiful as is the weeping willow, I was careful to say "I should greatly prefer to start five thousand elms or maples if it could be done as easily as my five thousand willows seem likely to be stuck in the ground." While regretting that so many applicants should be disappointed, I urge those who failed to get the willow (and I expect the same of all who succeeded), to try the far better plan of planting our common but very beautiful white ash or elm, maple, white oak, tulip, American linden—or the Scotch fir and European larch. I advise our boys also to raise these

trees from the seed which may be easily gathered every autumn.

The Schools of Forestry have exerted a remarkable influence in Germany in diffusing among the people a general and genuine interest in arboriculture. They regard forests as their friends, and understand their climatic influence and economic value in staying spring torrents, preventing summer droughts and supplying lumber and fuel. The Germans have a passion for nature, and love to frequent their beautiful groves and gardens, for parks and woods abound in or near their cities and towns. The rural and suburban adornment, now the pride and glory of so many beautiful towns in Germany, and the fruit of this revived love of arboriculture, is largely due to the influence and literature which have emanated from her Schools of Forestry. Hence the wanton forest fires so common and destructive in America are comparatively unknown in Germany. The forest incendiary would be regarded as a common enemy, like the poisoner of an acqueduct, recklessly destroying that which it is the interest of all to preserve. The Forest Schools have created a healthful public sentiment which constitutes the best possible protection of the woods.

Efforts are now making to organize a Department of Forestry in connection with the University and new Arboretum of Edinburgh. Hitherto Forestry has been little taught in England, and her young foresters have therefore been educated on the Continent. There is a growing conviction of the need of such institutions in England, due largely to the able and persistent exertions of Rev. J. C. Brown, LL.D., to whom I am indebted for many statements given in this paper. The London Journal of Forestry says: "The University of Edinburgh possesses remarkable facilities for the creation of a School of Forestry, which with some slight additions could be easily converted into a thoroughly equipped Forest Department, capable of teaching the science of Forestry in the most complete and efficient manner.* Such an Institution is one of the greatest wants of the age in this country, and no country in the world requires it more. With India, Canada, Australia, New Zealand and South Africa, not to mention numerous smaller dependencies of the British Empire,

* This language is equally applicable to the Sheffield Scientific School and to several scientific schools in other States.

crying out to us to furnish them with thoroughly educated foresters, to conserve and restore their fast disappearing forests, or to create new ones, it is a standing blot on the institutions of our country that we cannot educate and qualify at home the men who are needed for this important service. Such an institution would be of inestimable value to India and all our colonies, and exert a most beneficent influence on the management and productiveness of our home forests and the rural prosperity of the whole country. The forest wealth of Canada is being rapidly exhausted. The great pine forests on the Ottawa, St. Maurice and Saguenay rivers, with their wonderful net-work of tributary streams, are rapidly disappearing beneath the ruthless ax of the lumberman. All the more accessible parts of these great forests are already cleared of pine timber. That huge tract of forest between the Ottawa and the St. Maurice, which once seemed inexhaustible, is fast disappearing beneath the destroying ax."

Dr. Hooker, Director of the Royal Gardens at Kew, says: "Forestry, a subject so utterly neglected in this country, that we are forced to send all candidates for forest appointments to France or Germany for instruction both in theory and practice, holds on the Continent an honorable, and even a distinguished place, among the branches of a liberal education. In the estimation of the average Briton, forests are of infinitely less importance than the game they shelter, and not long since the wanton destruction of a fine young tree was considered a venial offence compared with snaring a pheasant or rabbit. Wherever the English rule extends, with the single exception of India, the same apathy prevails. In South Africa, millions of acres have been made *desert*, and more are being made desert annually, through the destruction of the indigenous forests; in Demerara the useful timber trees have all been removed from accessible regions, and no thought is given to planting others; from Trinidad we have the same story; in New Zealand there is not now a good Kauri pine to be found near the coast, and the annals of almost every English colony repeat the tale of willful, wanton waste and improvidence. On the other hand, in France, Prussia, Switzerland, Austria, Italy and Russia, the forests and waste lands are the subjects of devoted

attention on the part of the government, and colleges provided with a complete staff of accomplished professors train youths of good birth and education to the duties of State foresters. Nor, in the case of France, is this law confined to the mother country; the Algerian forests are worked with scrupulous solicitude, and the collection of vegetable produce from the French Colonies in the Museum at Paris, shows that their forest products are all diligently explored." The above criticism of the neglect and inaction of England applies equally to America.

One of the oldest and best schools of forestry in Europe is at Nancy, a beautiful city of great historic interest, pleasantly located on the left bank of the Meurthe, and at the base of a long range of wooded and vine-clad hills, about two hundred miles east of Paris. The parks and gardens of the city are finely adorned with trees and shrubbery. The Department of Meurthe, of which it is the capital, owes much of its rare rural beauty to the influence of this celebrated school. Forestry began to be studied as a science in France during the last century, though these investigations were long interrupted by the French revolution and the consequent wars. On the re-establishment of peace this study was resumed, and the School of Forestry was organized at Nancy, which, enlarged and more fully equipped, is now liberally supported. The cabinets, museums, apparatus and appliances of every sort, seemed to me most complete and ample, although the Director informed me that their choicest material was already packed for the Paris Exposition. Instruction is given gratuitously to those who prepare for the State Forest Service, and the importance of this service may be inferred from the fact that the State forests cover an area of nearly three millions of acres, or about the size of Connecticut, with a gross revenue of about seven millions of dollars, or deducting all expenses, a net revenue of over five millions of dollars. The total expense for board, lodging, uniform, instruments and pocket money, is from four to five hundred dollars a year. To "foreign students" a moderate charge is added for tuition. I found a considerable number of English students in attendance here last summer, who are candidates for forest service in India.

The course occupies three years. The daily work requires ten

hours, and fifteen hundred hours must be given to study, each half year. In the Winter Session, from November 1st to May 1st, seventy-five lectures of an hour and a half each are given on forest economy, and the same amount of time is allotted for preparation of the special topic of each lecture, embracing in the course, the exploitation of forests; relation of forests to climate; natural history of different kinds of trees; management of forests; conversion of one form of forest into another; and desirable qualities and defects of woods. The same number of lectures and the same amount of study are devoted to botany—the structure, organs, physiology and geographical distribution of plants. Of the seventy-five lectures devoted to mathematics, twenty are taken up with land-surveying and levelling, fifteen hours are given to the preparation of plans under the direction of a professor, twenty-two hours to elevations in water-colors, the same time to sketches and descriptions of rising grounds and to diagrams and calculations of polygonal figures, and also to elevations and designs in hatchwork. There are also lectures and lessons in road and bridge building, such as may be required in the exploitation of forests; in forest law and in the German language, together with some military instruction and drill, and practice in horsemanship.

In the Summer Session, from May to September, thirty-one days are spent in botanical and professional excursions in the Vosges, the Jura and other mountains, in which are visited forests in all stages of treatment and exploitation, and where the students are required to practice in the mensuration of wood and timber. Six days are allotted to preparing a report of the tour of observation and an herbarium of the plants collected. Seven days in the field and fifteen hours in the study are given to making a diagram with report, full calculations and topographical plan, including levels and a reduced drawing of the same, and one day in each section of the forest visited to a mensuration of a supposed felling and the preparation of an official report of it. Five days of work on the ground are given to the study of an imaginary projected road, and twenty days to making drawings and specifications and estimates relating to embankments, consolidating the scarps of ravines, building barriers of masonry or fascines across the bed of

streams, and cutting terraces along the scarps. Six days are spent in military reconnaissance with reports and sketches, and in competitive rifle-shooting. The examinations occupy twenty-one days, and eighteen are spent as holydays.

In the second year substantially the same topics of an advancing grade are pursued with an equally full course of study and lectures. The season for cutting timber, the ages of different kinds of trees to be felled, the proper time for a revolution or forest crop and its restoration; mineralogy, lithology and the geological features of France; saw-mills and everything relating thereto, are among the additional studies of the third term. In the summer session, twenty-three days are spent in the forests of Meurthe-et-Moselle and of the l'Aine, in the study of the management of fellings formed of mixed timber, and of coppice being converted into timber forest, and fourteen days are allotted to the preparation of reports of these observations. Two days are devoted to land surveying and six to trigonometrical surveys, making a trigonometrical survey of a forest in the environs of Nancy or of the Vosges, reconnoitering the ground, planting signals, measuring a base line and observing the angles. Twelve days are assigned to the preparation of diagrams and calculations of the net-work of angles and a connection of this net-work with the lines on the map of France. Eleven days are given to the study of the saw-mills in the Vosges, five days of work on the ground and six in the class-room are given to preparing a sketch and a description of diagrams of the mechanism of five saw-mills selected as the best specimens found in operation; to experiments in the gauging of water-courses, the effect of water-wheels, and the time required in the work of sawing, and to the general coefficient of waste.

The Winter Session of the third year extends over the five months from November to April, and is designed for advanced students. In addition to some branches already enumerated, zoölogy with especial attention to entomology, the ravages committed by insects upon forests, the means of averting or destroying them and of recovering a forest ravaged by them; the fixation of sand dunes, the reclamation of barren wastes, and the re-foresting of denuded mountains; the geology and

mineralogy of the mountains of France, mountain torrents, their causes and the means of preventing them, the plans of work projected and the works accomplished; the chemistry of vegetation and all that relates to the production and assimilation of atmospherical and terrestrial elements. The Summer Session of the third year, continuing five months from the first of April, is largely occupied with field-work and observations, especially in the study of the oak forests of Central France, the coniferous forests of the Vosges and Jura and the reforested regions of the Alps. During the entire course the field excursions are made under the direction of competent professors, and careful memoirs of these journeys and observations, with sketches, plans and diagrams are always required.

Italy has experienced the disastrous effects of forest denudation, in climatic excesses, in spring torrents and summer droughts, or at least, in the great diminution of the summer streams and rivers—the sources of irrigation. A code of forest laws has lately been passed, for the extension and protection of the national forests, and for the replanting of communal and private woods. The scientific training of professional foresters is found needful to repair the great waste and damage done in previous centuries. The officers charged with the administration of these forest laws are mainly graduates of the Royal Instituto Forestale at Vallombrosa. While in Switzerland, a letter from our Minister at Rome, Hon. George P. Marsh (who had been informed of my errand in Europe), strongly advised me to visit Vallombrosa, and a letter from Mr. Marsh to the Director General, Adolfo di Bérenger, secured every facility for observation and information when I did visit that institution. Founded as an abbey by Pope Alexander II. in 1070, it early became one of the most celebrated monasteries of Italy, if not of the world, remarkable for its romantic situation (vallis umbrosa, or shady valley of the Appenines, nearly six thousand feet above the sea), its great wealth, the extent of its lands and of its grand planted forests. The present magnificent buildings were erected about two hundred and fifty years ago (1637). For centuries this place has been visited by distinguished travelers. Dante delighted to ramble among these magnificent scenes. Mrs. Browning says of Milton:

"He sang of paradise and smiled,
Remembering Vallombrosa."

When penetrating these dense forests and clambering up the steep ascents to the valley summit, I felt the fitness of his familiar words, and familiar they deserve to be with all our youth.

"Thick as autumnal leaves that strew the brooks,
In Vallombrosa, where the Etrurian shades
High over arched, embower.
. . . And overhead up grew,
Insuperable height of loftiest shade,
Cedar, and pine, and fir and branching palm,
A sylvan scene; and as the ranks ascend
Shade above shade, a woody theater of stateliest view."

An hour's ride from Florence by the Arezzo Railway brings one to Pontassieve. Thence a drive of some eight miles by a series of zigzags and through avenues of cypress and mulberry trees, leads to the terminus of the carriage road. Grand and extensive views of the beautiful valley of the Arno (Val d' Arno), open at every turn, with fine vineyards, orchards and highly cultivated fields, here and there protected by long dykes from the river floods which forest denudations on the tributaries of the Arno have occasioned. From the road a foot and mule path of three miles up a steep ascent leads to the ancient monastery. Here were workmen cutting spars for ship building, to be floated down the Arno to Pisa, or into the Mediterranean. These Benedictine monks centuries ago understood well the economic value of tree planting. It is due to their sagacity and foresight that these vast lands are now densely covered with various pines, firs, beech and chestnut. The very position of the trees, standing in exact rows, shows that tree planting on a large scale has here been successfully carried on for centuries. The silver firs, planted around the abbey centuries ago, are now magnificent and stately trees.

The following sketch of this Forest School is condensed from a fuller history given me by Director Bérenger. This monastery was appropriated by the State in 1865, and opened as a Forest School in 1867, though its organization was not completed till nearly two years later. As the snow lies deep for three months on these mountain heights, the school is transferred for four

months, from November to March, to the old castle of the Counts Guidi at Paterno near the base of the mountain, and only twelve hundred feet above the sea. During the remaining eight months the head-quarters are at the high elevation of Vallombrosa. The contrast in the elevations of the two locations favors the maintenance of two distinct arboretums, the one at Paterno showing the vegetation of Southern Italy, and even the tender exotics of the tropics, while on the heights of Vallombrosa are planted the trees of Northern Europe and America as well as of the Alps. Great varieties of pines, firs, larch, ash, chestnut, oak, beech are cultivated in the nurseries for planting on the slopes and heights of the Appenines. The Director expressed special interest in the culture of the Fraxinus Americana—our white ash. The students each have their small nursery lots in which they try their hands in planting and trans-planting various trees, thus uniting theory and practice.

The Institution has its director and five professors, a library containing nearly 2,500 volumes of forest literature; a well furnished chemical laboratory; a meteorological observatory, where the indications of the thermometer, barometer, pluviometer, anemometer, hygrometer and seismometer are regularly recorded; instruments for tree-measuring and surveying and various arboricultural instruments, models of timber slides; timber carts; sections of wood, indigenous and exotic, and objects of natural history relating to forestry. The professors are appointed by the King, on the recommendation of the Minister of Agriculture. The number of pupils admissible is sixty. Besides the common rudiments, candidates for admission must pass an examination in history, natural history, algebra, geometry, physics and chemistry. The students wear the neat uniform of the Institution, which is that of a forest guard, with oak twigs of gold lace on the collar and cap. The discipline is mildly military, the students respond to the call of the trumpet instead of a college bell, cannot leave the precincts without permission, and are liable to confinement for insubordination. The students make frequent and sometimes extensive excursions through the national and communal forests, with the Professor of Natural History, to observe and collect specimens; with the Professor of Mathematics and Surveying, to make plans

and elevations of the surrounding lands, measure the height and girth of trees, calculate the amount of timber, and learn the various methods of management and exploitation of forests, and with Director Bérenger for special exercises in practical forestry. Besides regular lesson trips, a long excursion is made annually to some extensive woods. One of these journeys of observation, occupying a month, extended to Naples during the International Exhibition of Woods used in Ship building, and included the inspection of the leading forests in Southern Italy.

The following is the Curriculum:

FIRST YEAR. *Mathematics*, including Algebra, Geometry and Trigonometry. *Chemistry*—Organic and Inorganic, with experiments. *Natural History*—Botany, Systematic and Vegetable Physiology. *Forestry*—Theoretic and Practical. *Languages*—Italian, German and French, with Reading, Writing and translating of Forest Literature.

SECOND YEAR. *Mathematics applied*—Differential and Integral Calculus, Conic Sections, Measuring Heights of Trees and Cubic Contents, Plan Drawing and Valuation Surveys. *Climatology* and Forest Meteorology. *Natural History*—Botany, Dendrology, Forest Entomology, Geology and Mineralogy. *Forest Economy*—History of Forest Science, Practical Sylviculture, Seasoning of Timber and Exploitation of Forests. *Elements of Agriculture*—Improvement of Soils, Pasturage, Drainage, Agriculture, etc. *Languages*—Exercises in Italian, German and French.

THIRD YEAR. *Mathematics applied*—Rates of Growth of Trees. Mensuration, Preparing Charts and Levels, Estimating Condition and Value of Forests, Forest Administration—Statistics of different Woods, Classification of Forests, Reclamation of Barrens and Wastes, Planting of Sand Dunes, and of Marshes. *Forest Land*—Government and Pastoral Rights. *Forest Economy*—Political and National. *Languages*—Italian, German and French.

The first year is mainly devoted to scientific training, and in the second and third years the practical details of forest management are taught. Tracts of land bearing evergreen and deciduous trees of various ages are set apart to be managed by individual students. In the nursery also, each has a division bearing his name where he may show his skill, patience and

fidelity in preparing the soil, sowing the seed, watering the plants, and trans-planting the young trees.

In Italy, Germany and France, the advice of the Government foresters is given gratuitously to all tree-planters, and the young trees are furnished from the nurseries connected with the Schools of Forestry at a nominal price far below the cost, in order to encourage tree-planting to the utmost. With all proprietors of forests, whether the State, the Commune, corporations or individuals, the Government enjoins first, what must be done in all cases, and secondly, sets forth what may be done, that is, what is desirable but optional. In certain localities, the owner must get the permission of the forester of his province before he may fell trees on his own grounds. If the interest of that province and of the country require the retention of trees on the mountain tops, the State compensates the owner of the land for any loss thus incurred, or the older and larger trees only are cut, and a continuous forest growth maintained. It is their theory that the forests belong not to one generation only but to all, and each is bound to leave them as good as it found them.

Schools of Forestry in Europe are of two kinds; first those designed exclusively for the study of forest science and its collateral branches, the *Forstakademie;* second the *Allgemeine Hochschule*, or the collegiate or polytechnic institution with a comprehensive course of study, of which forestry is one prominent department. Nancy and Vallombrosa are examples of Forest Schools, pure and simple. Carlsruhe and Hohenheim will illustrate the other class. "The Polytechnic" in Carlsruhe comprises six separate departments, viz: Mathematics, Engineering, Machinery, Architecture, Chemistry and Forestry, with a staff of forty-nine professors, lecturers, tutors and assistants. I was struck with the extent of the eleven "Collections" here provided to aid in instruction, including objects connected with forests; models connected with engineering, machinery and architecture, besides the usual botanic, mineral, and philosophic collections, and an arboretum or forest garden. Professor Meyer said that each of these departments really helps all the others, and the union plan proves the most economic and feasible, and that the two Professors of Forestry here by the aid of their associates accomplish results which require from five to seven professors in the isolated *Forstakademies.*

The Royal Wurtemburg Academy at Hohenheim is a School both of Agriculture and Forestry. Its immense edifice, formerly a summer palace of the Wurtemburg kings, is delightfully situated on very high ground nine miles from Stuttgart. Near the building is a fine park and experimental and botanic gardens, groves and an arboricultural nursery. The botanic garden covering over twelve acres contains some two thousand species and varieties of plants important in forest and naval economy, and an "exotic garden" of twenty acres specially adapted to forest botany. Near by upon the same mountain range is a forest district of about six thousand acres, embracing a variety of soil and of trees. The institution has an extensive collection of implements used in practical forestry, with models of machines and studies pertaining thereto; a museum of forest products, an herbarium containing over ten thousand species, and a very interesting collection of microscopic preparations more extensive than I had elsewhere seen, with a curious collection of pathological specimens, illustrative of diseased malformation and some seven thousand specimens of fruits and seeds. Great varieties of fine wood showing the texture and grain, are exhibited in the museums of all Forest Schools, but this is a remarkable collection of "microscopic specimens"—transverse sections of wood thin as the finest paper arranged in books as photographs are set in the spaces of an album. Held up to the light, these thin sections are translucent, almost transparent, and show the most delicate shades in the grain of the wood. Here is also a collection of noxious insects and all animals harmful to trees. The insects are shown in all their progressive states, as eggs, larvæ, pupa or chrysalis, caterpillar and moth, with their nests, and perforations in the stems or branches, and with samples of the trunk, bark, branch, root, leaf, cone or fruit, both sound and injured. For a careful comparison, the healthy and diseased specimens are placed side by side.

The curriculum fills two years, and in the forest department embraces among others the following topics: Forest Economy; History and Literature of Forest Economy; Forest Products, including Forest Botany, Sylviculture, Forest protection, Technical properties of timber, Uses of forests and forest technology; Forest administration including mensuration of trees and forests,

partition of forests for exploitation, valuation of forests and practical management of forests, forest excursions, "demonstrations" in different forest districts, Botanic Garden and Museum of Forest Products, cubic measurements of trees and cubic contents of woods, land surveying and levelling and mensuration of forests with theodolite.

For lodging and tuition, the students, if subjects of Wurtemburg, pay less than forty dollars a year, but foreign students are charged threefold more. Foreigners are admitted who pass the required examination and produce the "ticket of legitimation" from the proper authorities. Dom Pedro appreciates the national importance of forestry in Brazil. I was much interested in an intelligent and ambitious young Brazilian who is here training himself for a forest appointment in his native country.

A striking illustration of the influence of Forest Schools is found in the authorship of their professors and graduates. In the long run, the influence of any institution may be measured largely by the authorship which it prompts. Judged by this test, the Forest Schools of Europe have made a worthy record. By the coöperation of their professors and other writers, and sometimes of government officials especially commissioned to investigate different branches of the subject, the literature of forestry, already large, is now rapidly increasing. A German catalogue gives the titles of 1,815 volumes on forestry issued prior to 1842, and the titles of 650 works published in the six years prior to 1876. On an average, over one hundred new books on forestry appear annually in the German language. One of the Spanish Commissioners to the Centennial Exposition, Señor Morera, published a list of 1,126 volumes on forestry in the Spanish language alone. Director Bérenger of Vallombrosa has published over thirty books and pamphlets, among them one pronounced by Hon. George P. Marsh of great value on "The Absolute Influence of Forests on the Temperature of the Air." He also edits an able Journal of Forestry, "The Giornale di Economia Forestale."

The question has been much mooted in Europe of late, whether Schools of Forestry should be isolated, or connected as an additional department with existing universities or Poly-

technic or other institutions of a more comprehensive character. This was the leading topic of discussion at the last Congress of Foresters which was held at Freiburg in Baden, and attended by nearly four hundred members, representing all parts of Germany, also Switzerland, Austria and Russia. The leading German writers on forestry and the most prominent government officials in the management of the Crown and Communal forests were there. The President of the Convention was Dr. Nordlinger, the eminent Professor of Forestry at Hohenheim. The discussion, which was virtually a continuation of the debate begun at the Convention in Mülhausen the year before, awakened great interest and occupied six hours, the sederunt commencing at 8 A. M. and continuing, with an hour's intermission, till 3 P. M.

A brief summary of the leading arguments shows the feasibility of connecting a Department of Forestry with the Sheffield Scientific School. The discussion was opened by Professor Danckelmann, Director of the School of Forestry at Newstadt-Eberswalde in Prussia, defending the separate *Forstakademie*. He contended that Universities are designed to aid thorough investigations in the abstract rather than in the concrete. Though rich fountains of knowledge, they do not teach practical skill. The Forest Academies on the other hand keep the practical ever in view, and the attainment of knowledge is always combined with practice. Four things are essential; first, instruction in the technical work of forestry; next, in the management of forests; thirdly, in scientific research; and lastly, in the practical application of theories. Special schools are best fitted to secure these results. The *Hochschulen* are located far away from any forest, and the professors therefore are less acquainted with practical forestry, and the students, though more varied in their attainments, will fail to know thoroughly the things most essential for their profession; they will remain strangers to forests, and will not learn how to question trees; they may see cases of dead insects and yet learn nothing of the lives and habits of insects. To be a means of instruction, the forest must be a demonstration ground, and should be so situated that it can be visited daily without fatigue or expense. Though the University is the center of

culture and aristocracy, each of these is of secondary importance in the training in forest technology. The professors of the accessory sciences are out of sympathy with the forest, and busy themselves with problems irrespective of their relation to forest science. If it be said that the Universities have produced more eminent writers and thinkers than the forest academy, the remedy should be found in the academy and in the enlargement of its course of study, with opportunity for the student to resort to the forest every day, proposing and solving his questions on vegetable physiology and zoölogy.

The speaker appointed to open the discussion on the other side, Dr. von Seckendorff from Vienna, attributed the origin of isolated schools of forestry to the former state of forests, and the limited education required for forest service in a by-gone day. But now a more scientific method of research in forest matters has been introduced, and a higher testing examination is demanded of students in forest science. A liberal education is essential here as well as in the other professions. The advocates of separate forest schools claim two points of especial superiority; first, that their students are better trained in practical forestry, and second, that in these only are the studies conducted with due reference to the requirements of the forester. They assume that in the vicinity of the Allgemeine Hochschulen there are no forests suitable for the instruction of students, and that a purely theoretical education only must here prevail. These assumptions are unfounded.

The number of University and *Hochschule* towns in Germany, richly surrounded by woods is very great. In a line drawn from the coast of the German Ocean to the place of this meeting alone, there are Hanover, Göttingen, Marburg, Giessen, Heidelberg, Carlsruhe and Freiburg, all so surrounded. It is not the extent of a forest which decides its suitability as a means of instruction, so much as its variety of trees and modes of treatment and exploitation.

The second assumption will not bear examination. Science and practical work are not antagonistic to each other. In the Universities instruction does not go beyond what is desirable for every educated man. And there ought to be no ground for the suspicion that any students of forestry choose that depart-

ment because it makes the least demand upon them. Situated near railways, the Universities have the best facilities for forestral excursions and for fullest demonstrations in the field. As a matter of fact, the special schools do not turn out more practical men, and are not supplied with better districts for excursions, while on the other hand, in the *Allgemeine Hochschulen*, the instruction in the accessory sciences can be more complete and extended, and be given at no additional expense to the State.

After a long and spirited discussion by prominent professors from both classes of Forest Schools, the President, Dr. Nordlinger, desired those who were in favor of combining instruction in forestry with other departments in the university or *Allgemeine Hochschulen* to rise, when seemingly the whole assembly rose, which was followed by vehement applause. When those who favored the separate system were invited to rise, only sixteen members stood up. It will thus be seen that the result of the fullest and latest experience of Europe is in favor of organizing a forest department in connection with some existing collegiate institution.

INDUSTRIAL SCHOOLS.

No feature of the Educational Systems of Germany, Switzerland, Austria, Belgium, France and other European countries is more striking to an American observer, than the large number of Industrial Schools, specially designed to train apprentices and make skilled workmen and competent foremen. These schools are very numerous, and as various as the kinds of industry pursued in each country or province. There has been the greatest progress in manufactures in those countries where these schools have been maintained longest and most liberally. Geneva has for many years maintained a Horological School, and the Swiss watches have long been celebrated throughout the world. Last summer I visited the new Horological Institute then building in Geneva, a magnificent edifice to cost over $200,000, and also witnessed the work of the school then in its old quarters. The course of study and practice covers three years. There were seven instructors, who are experts both in the theory and practice. No one can graduate till he has proved his skill, again and again, by making an entire watch of standard excellence. The patient training of these classes, or rather of each individual member, in the minutest particulars, both in theory and practice, and the criticism of defects in the work done, illustrate the attention given to details in all Industrial Schools.

The same attention to minute details is seen in the Industrial School at Lyons, France, to which the preëminence of that city in the manufacture of silk is largely due. It has twelve professors, and the course of study occupies three years. Here, as in all Industrial Schools, a prominent study is drawing, drawing ornaments, tinted drawings, and sketching plans of machines from memory. Thorough instruction is given in every detail relating to the manufacture of textile fabrics, especially of silks, the natural history of silk, treatment of the silk worm and cocoons, spinning, throwing, weaving and testing of silks; sorting and cleaning; winding, warping and beaming; changing of looms for weaving different styles; defects in operations and their remedies; decomposition of tissues;

chemistry, especially as applied to dyeing and printing; physics with its applications to heating, steam-boilers, drying and ventilation; mechanics, embracing prime motors, materials and construction; hygiene, including physiology, noxious and useful animals, dangerous and unhealthy occupations, contagious diseases and how to avoid taking them; rural economy and "industrial plants." Manual exercises are conducted in the workshops in making, mending, putting up and shipping looms, in turning, filing, forging, fitting and various joiner's and machinist work. Frequent visits are made to the various factories in Lyons, under the lead of an instructor, where every part and process is fully explained. The students afterwards draw from memory plans of patterns and of machines.

About one hundred pupils on an average are in attendance. The regular charge for tuition, use of laboratories and workshops, is $140 a year. Indigent students are aided by the Chamber of Commerce and Municipal Council of Lyons, so that a portion only pay the full tuition. That this school, conducted without aid from the government of France, should be so liberally supported by the citizens of Lyons, and continue to flourish for so long a period, is ample evidence of its great usefulness in the opinion of the most competent judges.

More than sixty years ago France started special schools in the arts of designing, engraving and dyeing; in silk and ribbon weaving and lace making; in carving, stone-cutting and diamond-cutting (hence the diamond-cutting for the world is still carried on mainly in Paris); in porcelain and various ceramic productions, and the preëminence thus gained is still retained. The artistic manufactures of France command the markets of the world. The Industrial Schools more recently organized in Germany, Switzerland, Belgium, Austria, Italy and England, which in the aggregate are numbered by thousands, make these nations formidable competitors in artistic work.

When invited by the Minister of Public Instruction of France to visit the National Porcelain Factory at Sèvres, I expressed to him surprise that such an establishment should come under the supervision of the Educational Department, to which he replied, "It is because it is the duty of this department to supervise and control the Preparatory School for Sèvres, which

you should first visit." On inspecting this School of Design in Paris, I found in the lower rooms the methods and work of a first-class drawing school. But in the upper rooms the classes were painting on elegant goblets, cups, plates, vases and other choicer wares, just brought from Sèvres and to be returned there for baking. After witnessing this truly artistic work, I no longer wondered that in the Sèvres factory itself the artisan had indeed become the artist, and that only men of princely wealth could procure the products of this unrivalled establishment.

In Belgium the girls have shared the advantages of Industrial Schools as well as the boys. The schools for training in lace-making and embroidering, in Brussels, have long been celebrated, and kindred schools have more recently been opened in Rowlers, Ghent, Ath, Deerlyk and in many other places in that busy little kingdom. To those familiar with this fact, it was no surprise that Belgian lace shown at the Philadelphia Exposition was unrivalled. Some Industrial Schools are maintained wholly by the central government, others partially, and still others are supported by endowments, and many are private institutions dependent mostly on tuition for support. A large number called apprentice schools are maintained by benevolent associations. These are designed to train boys and girls both in skilled manipulations in various trades, and in the practical studies and theories most helpful in such pursuits.

Belgium, with about fifty industrial schools, and fifteen thousand apprentices graduated from them, Germany with over fifty-two thousand apprentices in fourteen hundred and fifty industrial schools, and France with twelve thousand industrial scholars, show the practical appreciation of these institutions in these countries, which distance the competition of surrounding nations in the great markets of the world. Steam and the telegraph are bringing all nations into such near neighborhood that industrial ascendancy will belong to that country which provides the best industrial education.

The Artisan School established nine years ago in Rotterdam, Holland, has already two hundred pupils and commands the confidence of that community. Candidates for admission must pass an examination in the simpler rudiments, and are expected

to remain in the school three years. The institution is both a school and a shop, and the time of the pupils is daily divided between the two. Drawing, Physics and Elementary Mechanics are prominent among the practical studies of the school room. In the shops a great variety of trades are taught, such as stone-cutting, including keystones, steps, thresholds, flooring tiles and placing plinths; masonry, including plain walls, foundations, chimneys, niches, sewers, arches, &c.; smithery, or making cramps, hooks, hinges, nuts, locks, girders, &c. The braziers are taught forging, turning, stretching and soldering, and make water-cans, dust-pans, kettles, basins, springs and various kitchen utensils. The instrument-makers learn to cut screws and worms, forge steel and copper and cast copper objects. The carpenters make chests, desks, trestles, windows, doors and the like. The painters learn to make putty, grind paint, polish wood, set glass, paint letters and to grain in imitation of marble or the choicer woods. In the Philadelphia Exposition the admirable exhibit of the various articles made by these boys proved alike their skill and the practical value of this institution.

In view of the great variety of the work and the need of individual instruction, twenty-one masters are employed in this school. Great prominence is given to drawing, as lying at the foundation of skilled industry. The Director is the teacher of construction and projective drawing. There are four other teachers of drawing—rectilinear, architectural, ornamental and model drawing, and one or more in each of the other departments above named. The boys draw simple constructions from wood, iron or brick work, such as window joints, doors, jambs, ravelins, stair-cases, roof-constructions, brace-works, springs, locks, cornices, architraves, &c. The school studies occupy each morning and the practical instruction in the workshops the afternoon. As soon as the boys are made familiar with the tools, they are entrusted with practical and marketable work, not sham or play-work, but the making of saleable articles for the trade, so that they at once feel that they are engaged in real business. This plan excites the ambition of the boys and adds interest and dignity to their work. The workshops are of the most approved kind and are supplied with the best tools and appliances. In the carpenter's shop, there are benches

with their appliances for eighty boys; and in the smithies are all needed forges, anvils, vices, benches, &c., for seventy boys. The directors, on whose authority the above statements are given, say, that on successfully completing their three years course, these boys receive considerably higher pay than those who have not enjoyed the advantages of the school.

Needle work forms a part of the course of instruction for girls in a large part of the elementary schools of Europe. In Switzerland four thousand three hundred and seventy-three females are employed in schools teaching needle work. In some schools I saw these teachers training their scholars in the use of the American sewing machine.

When one has inspected her technical schools and her twenty-nine industrial schools, he is no longer surprised that Switzerland is especially the home of industry, for her mechanics are educated and skillful. Though hemmed in by mountains, without a seaport, with few minerals and no coal, with costly transportation, all freight from the sea board coming over foreign territory, she threatens the ribbon trade of Coventry, rivals the English in muslin and delaine, and the world in watches and wood-carving. More than one million watches are made annually in Geneva and Neuchatel alone. The Swiss are an ingenious and industrious people. They believe in the dignity of labor and in the thorough mastery of some trade. In their industrial schools, prominence is given to drawing, designing and moulding, as well as to practice in the trades. Hence the world pays substantial tribute to Switzerland for the exquisite taste displayed in the decorative arts, their unequaled carvings, their beautiful chasings in gold and silver, their silk ribbons, their watches and music boxes.

The Earl of Rosebury says that the cause of this rapid progress of Swiss manufacture is plainly "the complete and *special* education which she gives in primary schools and *practical* schools, and *trade* schools, and secondary schools, and cantonal schools, all topped up by the great Polytechnic Institute at Zurich. The Swiss manufacturer is master of his business, and his workmen with whom he is in perpetual contact, respect him for this. Master and servant have been at the *same school learning their craft*, and they know it thoroughly."

Public schools, industrial schools and the Polytechnic Institute have in a remarkable manner unified and fraternized the people of these twenty-five cantons. Though separate in race, religion and language, they are one in national sympathy and interest, proud of their history, and prouder still of their recent progress and manufacturing prosperity. While beggars are found everywhere in Europe, there is less pauperism in Switzerland than in any other nation on the continent. With no communism, there is still a general diffusion of property, and almost every one is a land-owner.

In our country by reason of the restrictions imposed by our Trades Unions, apprenticeships are so much lessened that it is now difficult for boys to learn a trade. Hence increasing numbers are growing up to manhood in idleness, without any regular calling, or seeking to earn a livelihood without manual labor. This limitation of apprenticeships is a short-sighted and suicidal plan, sure to cripple our future mechanics. It seeks a temporary gain at the sacrifice of a permanent prosperity, and is depriving many boys of that thorough training in the several trades which is essential to their skill and success. The system of apprenticeship ought to be encouraged as an indispensable part of the practical education of our future artizans. Otherwise our youth must surrender the most lucrative positions to skilled mechanics imported from abroad. This waning of apprenticeships, which cannot easily be remedied, creates the greater necessity for industrial education.

In speaking of the substitution of steam power for hand labor, J. Scott Russell says: "Occupations which require no skill, but only brute force, will necessarily be vacated by human hands. Society, in the march of improvement, is as certain to do without the unskilled, unintelligent and uneducated as it is to do without wild plants and animals." Certainly any system of public instruction which leaves industrial education out of the account is radically defective. Fortunately this was the theory and practice of the early settlers of Connecticut. The founders of this State valued and honored industry. The code of 1650 which stood in this respect unchanged for over one hundred and fifty years required, "That all parents and masters do breed and bring up their children and apprentices in

some honest lawful calling, labor or employment, either in husbandry or some other trade, profitable to themselves and the Commonwealth, if they will not or cannot train them up in learning to fit them for higher employments." In 1683, Penn proposed the following resolution, which was adopted by the Provincial Council, "That all children within this province of the age of twelve years shall be taught some useful trade or skill, to the end that none may be idle, but that the poor may work to live, and the rich, if they become poor, may not want." How different would have been the history of Virginia and South Carolina, with their sunny climate and greater natural resources, had the founders of those States preached and practiced these sentiments which have been the source of the thrift, growth and prosperity of the North. Elizabeth Thompson well says: "Honest labor is the need of the hour, alike demanded by the physical, mental, moral and financial condition of the nation. Industrial education alone can bring about this reformation by joining with labor skill, dignity and honor." Industrial schools are now more needed than new colleges. "The danger is not of over education, with earnest aims and in the right channels, but of a genteel and lazy dilettanteism."

I have discussed this subject partly in order to invite the attention of wealthy men to its importance, and ultimately secure liberal endowments for industrial education. The extract from the will of David Watkinson, given below, and the liberal offer of one hundred thousand dollars by Hon. T. M. Allyn for the support of an industrial school in Hartford, show that this need has long been felt. If the Loomis Institute with its large endowment shall be devoted to the purpose of industrial education, it will meet a great and growing want, which no existing institution in the State attempts to supply. If the liberal offer of Mr. Allyn should be continued and accepted, it would be a nucleus around which other gifts would gather till the school should prove a great benefaction to the State. Such, at least, was the result of the donation of Mr. Boynton in Massachusetts.

The Worcester Free Institute was started by the gift of $127,000 by John Boynton. This beginning led Ichabod Washburne to consider the pressing demand for industrial

training, and he gave $130,000 to enlarge the resources of the Institute. Further endowments were made by Stephen Salisbury of $250,000, and by the State of Massachusetts of $50,000 giving a total endowment of $557,000. If the surviving members of the Loomis family carry out their present plan, the "Loomis Institute" will have double this endowment. Without even the semblance of dictation in the plans which they alone have the right to form, and with a grateful appreciation of the beneficent spirit they evince, I most respectfully suggest to them, and to other wealthy men who desire to become benefactors of the State, this means of meeting a great public need and erecting a lasting monument to their memory.

The following is the plan of the proposed gift of Mr. Allyn to the city of Hartford, some five years ago.

To the Mayor, Aldermen and Common Council of the City of Hartford:

The undersigned hereby offers to give to the City of Hartford the sum of *one hundred thousand dollars*, to be expended in the establishment and erection of an industrial school (under such rules and regulations as the authorities of the city may from time to time make), for the free education of both boys and girls in the business avocations of life, agriculture and the mechanic arts. The school should be a model, fashioned after our best ideal. It should possess ample grounds for an agricultural department, botanical gardens, and workshops, where all the principal trades may be learned. Every boy, at the same time he is acquiring a knowledge of the arts, sciences and modern languages, should become a practical agriculturist, or master some useful trade. The girls should be instructed in all the practical duties of the household, become familiar with the chemistry of the kitchen, and made to master the art of making any article of a lady's wardrobe, and also they may learn bookkeeping, banking, telegraphy, photography or any other occupation that is within the measure of their strength and adapted to their tastes. In this manner the education of the student would become a healthful exercise and a most fascinating amusement, instead of being (like the present system) destructive to vitality, exhaust-

ing the brain, and converting the school-room into an unattractive place little better than a prison.

It is believed that the amount proposed to be given will be sufficient for the purchase of the ground, erect suitable buildings and supply all the tools and apparatus required for the carrying out of the enterprise. The annual expense incurred of running the institution, after deducting the amount it would be entitled to receive from the school fund, should be cheerfully borne by the city. Should the proposition be entertained and the city accept the gift, it may be necessary to execute articles of agreement to secure the faithful performance of the trust assumed by the city.

T. M. ALLYN.

EXTRACT FROM THE WILL OF DAVID WATKINSON, WHO DIED AT HARTFORD, CONN., DEC. 13, 1857.

Codicil No. 11.

Article V. "Desiring to render a public benefit to the community in which I live, and to the State of Connecticut generally, by aiding in the establishment in the town of Hartford of a Juvenile Asylum and Farm School, for the family and school and industrial training of a class of children not now adequately provided for in any educational or humane institution: I do give and bequeath to my Executors the lot of land of about ten acres, surrounded by four streets, known as the Pavilion property, with the buildings standing thereon, and by me estimated to be worth the sum of $40,000 and in addition to said lot the sum of $20,000, said lot to be conveyed in fee simple, and said money to be paid over to Henry Barnard 2d, Edmond G. Howe, William L. Collins, William N. Matson, Henry Clay Trumbull, Daniel C. Gilman, Roland Mather, Newton Case, Alfred Watkinson, John S. Butler, Henry A. Perkins, Albert W. Butler, Edward Goodwin, E. A. Bulkeley, William D. Shipman and Austin Dunham, or such of them as may be living at the time of my decease, as Trustees for the purposes and uses herein set forth, viz:—to aid in the establishment and support of an institution for the relief, protection, instruction, reformation and employment of children between the ages of

six and twenty-one years who may be voluntarily entrusted to it for any or all of these purposes by the parent or guardians, or committed to its charge by competent authority.

Article VII. The institution designed to be established and aided by this bequest, is to be organized and conducted on the general principles and methods recognized in the Rauhen House near Hamburg in Germany, and the Agricultural Colony at Mettray in France, as described in Barnard's *National Education in Europe* (Edition of 1854), and in the Boston Asylum and Farm School, incorporated in its present form in 1833, and the New York Juvenile Asylum, incorporated in 1851, with such modifications as may be by the Trustees deemed to be better adapted to the peculiar condition of the people of this State, or which may be suggested by their own experience or that of similar institutions."

The amount of the Watkinson Fund is now $207,000. Of this sum $162,000 is invested in productive funds and $45,000 in land. The last sentence of the will gives the Trustees authority to make such modifications as they may deem needful for the industrial training of the inmates of the School. If industrial education becomes a prominent feature of the Institution, it will, in the words of the will, be "better adapted to the peculiar condition of the people of this State." The principles and methods recognized in the Rauhen House and Mettray School may be inferred from the following statement: The "Colonie Agricole," at Mettray, near Tours, in France, was founded in 1839 as an institution for the reformation and training of children liable to become vicious and criminal. Besides receiving instruction in the necessary school studies, they are taught various useful occupations, such as farming, and the trades of the wheelwright, blacksmith, joiner, carpenter, mason, shoe-maker, wooden-shoe-maker, tailor, rope-maker, sail-maker, etc.

The Reform School of the "Rauhen House," at Horn, near Hamburg, was founded in 1833. Here as at Mettray, the "family system" is maintained. The labor performed includes house-keeping and home-work, field and garden culture, and such occupations as shoe-making, making and mending clothes and bedding, carpentry and wooden-shoe-making, woolen-thread

spinning, baking, masonry and painting, house-keeping and basket-making. There are also workshops for printing, book-binding, lithographing, stereotyping and wood-engraving. The girls fill the places of servants, cooks, washerwomen, ironers, laundry-women and seamstresses. The younger girls help the older, make and mend coarse linen, knit and mend stockings, etc.

The German Government has long sought to make industrial pursuits reputable and universal. To this end, members of the royal family have practiced as well as preached the gospel of honest work. In Carlsruhe, I learned of an excellent girls' school in the *Schloss*, in which the Grand Duchess of Baden, the only daughter of the Emperor of Germany, had recently placed her young daughter, with instructions that she should be excused from none of the household industries required of the other pupils, that she should be trained in sewing and knitting, and made as thorough a seamstress as if she were to earn her livelihood by her needle. During her school life she is not to be distinguished by any of the high titles which she may bear in after life. In all respects she is to be on a par with her young companions, receiving no favoritism in view of her rank, but to WORK and play, run and romp, give and take on perfectly equal terms with her companions, and receive exactly the same punishments if remiss in study or work. The present Crown Prince of Prussia early learned the cabinet makers' trade, and at Babelsberg near Potsdam, the Summer Palace of the Emperor of Germany, are shown articles of furniture of superior workmanship made by him. His cousin, Prince Frederick Charles, learned the trade of glazier, and became quite artistic and enthusiastic in his craft. Fine specimens of his work may be seen in the Potsdam Palace, consisting chiefly of colored glass tastefully joined together by means of lead and tin strips, like the fine colored memorial glass windows so often found in churches. Such examples of honoring industry have exerted a vast and beneficent influence throughout the German Empire

EDUCATION AND LABOR.

The great majority of our pupils must work for a living. By the ordinance of Heaven, the necessity of labor is well-nigh universal. Nature and history alike confirm the old decree, "In the sweat of thy face shalt thou eat bread." Teachers and school officers should carefully inquire whether our schools are accomplishing all they ought to do for the working classes. It is a grand result that all are trained to read and write and cipher, and learn something of the other common rudiments. In no part of the world, except Germany, are there so few *native* illiterates as in New England.

The general intelligence of the people is one obvious cause of our exemption from the railway strikes of last summer. The sober second thought prevailed here, while madness ruled the hour elsewhere. But beneficent as has been the influence of the public school in New England, it has by no means done its whole duty to the laboring classes. More should be said and done to dignify labor and prepare our youth to become skilled workmen as well as industrious and upright citizens. It is a mistake to suppose that education need create any aversion to labor, or that those who do the roughest work need the least schooling.

Under the system of slavery in the South, and until recently with the serfs of Russia and the equally illiterate farm hands of England, it was held as an axiom that schooling would make laborers discontented, restless and unprofitable servants, and that universal education would render manual labor distasteful and disreputable. Too much of this mischievous legacy of slavery lingers among us still. The silly and wicked notion that labor is menial ought to be refuted in our schools, where our youth should be early taught the necessity and dignity of labor, as the primal source of all human excellence and progress. Girls as well as boys should be early taught both in the family and school that to learn to be useful

is alike their duty, privilege and interest. Education should thus be made the auxiliary of labor. Instead of treating it as a degrading drudgery, education should elevate labor and render it more skillful and productive. If the true bearing of education on industry was taught in our schools, our youth would grow up under the salutary conviction that education is economy, and so far from degrading labor makes it more inviting and profitable, because the skilled workman so forecasts his plans that every blow tells, thus economizing his time and strength and stock, and even in the humblest work, accomplishing more, in better style, and with less damage to tools or machinery, than the boor who can use only brute muscle. Pride in one's work leads to higher excellence both in his craft and character. The skilled artizan who delights to do his best to-day, will aspire to do better still to-morrow. On the other hand, the too common theory that labor is a degrading drudgery will consciously demean any workman and bar improvement in his trade.

Connecticut is a busy hive of manufactories. The industrial interests of no State are more vital to its prosperity. We are a working people, and the cause of the workman is the cause of all. The problem of our State and of our day is to elevate work by educating and thus elevating the workmen. The masses are learning that mere muscle is weak, that brains help the hands in all work, that knowledge multiplies the value and productive power of muscular efforts. If knowledge is power, ignorance is waste and weakness. What a man *is*, stamps an impress upon what he does, even in the humblest forms of industry. The character of the work depends upon the workman. Whatever elevates the laborer improves his labor. In proportion as you degrade the operative even to the degree of serf or slave, you depreciate his work. You can dignify work therefore in no way so surely as by elevating the workman. The wealth and welfare of individuals and States, always dependent on labor, can be most fully secured only by educated labor. If rightly conducted, our schools, so far from breeding discontent with the humblest pursuits, will prepare for success in the ordinary callings of life.

Instead of this, I find in some cases the chief aim is promo-

tion to the next higher grade, and from that up to the highest or High School, and the programme is planned for those who complete the full curriculum, rather than for the majority who withdraw early for work or business. It is worthy of inquiry whether at each successive step the conditions of promotion may not wisely include the same studies and attainments which constitute the best preparation for the business of life, as well as for higher grades in school.

How to secure the best results with the least cost of time as well as money, is a problem not yet fully solved. Our text books, now too voluminous, should comprise less of minute details and more of practical methods and principles. Such topics in arithmetic as the least common multiple of common fractions, casting out of nines in multiplication and division, alligation medial and alternate, and commutation of radix, may well be omitted in a common school course, or briefly noticed in the appendix. Those and kindred topics, of no use in ordinary business, fill a large space in nearly all the arithmetics. They have a traditionary sanction. In continuing them the authors have consulted usage more than utility. Like the titled scions of rank in the old world, they have come down by so long a literary descent that no one disputes their right to their honored place. Worth more than all these complicated processes is the thorough mastery of the ground rules. In all our schools rapid mental combinations should be daily practiced till pupils can add, multiply and divide with the utmost facility and accuracy. This done, the rest of arithmetic will be comparatively easy and pleasant.

Ex-President Thomas Hill justly complains that our "Arithmetics have been expanded until the unfortunate pupil is lost in a wilderness of words, and does not find his way through, in time to learn to cipher. The science of arithmetic receives so much attention that the art is neglected. Life is not long enough to spend so long a proportion of it on arithmetic as is spent in the modern system of teaching it, and arithmetic is too valuable an art to have our children neglect to acquire facility in it, instead of being stupefied and disgusted with premature attempts to understand it as a science." It is certainly a useless repetition to require children to learn, for example, explana-

tions of the first principles of fractions, percentage and the like as they are scattered through four or five volumes, each successive series setting forth the same subjects only with greater fullness and complication. In many schools arithmetic is thus made a subject of study for eight or nine years, when three or four years ought to give the pupil the mastery of the essentials, including rapid mental combinations. He should learn the multiplication table early and thoroughly, and acquire great rapidity in all practical processes.

By the condensation or omission of too extended serial books in geography, grammar and arithmetic, and in the latter study mastering thoroughly only the practical portions and postponing the intricacies of compound proportion, permutation and the like, that not one in a thousand ever uses in the practical business of life, more time can be gained for reading, spelling, writing, the study and use of our own language, composition, at least in letter writing, and elementary lessons in the practical sciences, natural history, political economy, and the history of our own country.

WHAT BOYS ARE READING.

A timely appeal to the public has just been made, bearing the signatures of eminent citizens of New Haven who represent both political parties and the Baptist, Roman Catholic, Congregational and Episcopal churches. I welcome this warning, as I have had occasion to observe widely the pernicious influence of bad books and papers. Finding ten years ago that such papers as the *Boston Illustrated Police News*, the *New York National Police Gazette*, and *Day's Doings* were freely sold in the cars, I addressed a letter to the President or Superintendent of every railway in Connecticut asking if I might announce *authoritatively* in my next Report that "the sale of immoral papers is not permitted in the cars or stations of your railway." Cordial replies came promptly from the officers of every railroad of our State expressing their earnest purpose to do their part in the suppression of this great evil. One reply shows the spirit of all. "I fully appreciate your views and most heartily concur in your wish, and will do my utmost to prevent the circulation of such papers." Obscene books, papers and pictures are the worst of outlaws. The most indecent of this class are sold clandestinely. But there are others, sold openly, like those named in the following "appeal," which though less filthy, are more corrupting, if not more infamous than the most lecherous issues of the Parisian press. The poison which nauseates by an overdose, may be its own antidote. Professing to be illustrated histories of the week, these papers are in fact chroniclers of, or contributors to, the bar-room and the brothel. The safety of our youth now demands the utmost effort for the exclusion of such contamination. In behalf of the children of the State, I earnestly invoke the aid and coöperation of all parents, the officers of justice, the public press, and of all good citizens, in efficient measures for the suppression of the evil so well set forth in the following appeal and extracts from the paper of Professor Sumner.

"We desire to call attention to the cheap, trashy literature which is demoralizing the youth of our country. In this class we notice the paper named *The New York Boys' Weekly*, with a reputed circulation of 40,000, and *The Boys of New York*, with a reputed circulation of 50,000. These papers contain stories of the most sensational and slangy character, judging by the titles, of which we name the following: 'Dashing Dick, King of the Highway,' 'Yankee Claude Duval, the Dashing Knight of the Road,' 'Corkey, or the Tricks and Travels of a Supe,' 'Shorty, jr., or the Son of his Dad,' 'Bang Up, or the Boy Ranchero,' etc., etc. We see not one redeeming trait in these or other papers of this class. We are informed that many of the advertisements in their columns are of the most villainous kind. Will you not do what you can to warn your readers against the peril that besets our youth? We inclose Professor Sumner's article, reprinted from *Scribner's Monthly*, which we beg you to use according to your judgment in whole or in part.

Our object is not to advertise any periodical in place of those we deprecate, but only to warn the public of a danger suspected by few and realized by fewer still.

NOAH PORTER,	LEONARD BACON,
THEODORE D. WOOLSEY,	FRANCIS WAYLAND,
WILLIAM M. BARBOUR,	HUGH CARMODY,
JAMES E. ENGLISH,	EDWIN HARWOOD,

FRANCIS A. WALKER."

"Few gentlemen, who have occasion to visit news-offices, can have failed to notice the periodical literature for boys, which has been growing up during the last few years. The increase in the number of these papers and magazines, and the appearance, from time to time, of new ones, which, to judge by the pictures, are always worse than the old, seem to indicate that they find a wide market. Moreover, they appear not only among the idle and vicious boys in great cities, but also among school-boys whose parents are careful about the influences brought to bear on their children. No student of social phenomena can pass with neglect facts of this kind,—so practical, and so important in their possible effects on society.

These periodicals contain stories, songs, mock speeches, and

negro minstrel dialogues,—and nothing else. The literary material is either intensely stupid, or spiced to the highest degree with sensation. The stories are about hunting, Indian warfare, California desperado life, pirates, wild sea adventure, highwaymen, crimes and horrible accidents, horrors (tortures and snake stories), gamblers, practical jokes, the life of vagabond boys, and the wild behavior of dissipated boys in great cities. This catalogue is exhaustive. There are no other stories. The dialogue is short, sharp, and continuous. It is broken by the minimum of description and by no preaching. It is almost entirely in slang of the most exaggerated kind, and of every variety,—that of the sea, of California, and of the Bowery; of negroes, 'Dutchmen,' Yankees, Chinese, and Indians, to say nothing of that of a score of the most irregular and questionable occupations ever followed by men. When the stories even nominally treat of school-life, they say nothing of *school*-life. There is simply a succession of practical jokes, mischief, outrages, heroic but impossible feats, fighting, and horrors, but nothing about the business of school, any more than if the house in which the boys live were a summer boarding-house. The sensational incidents in these stories are introduced by force, apparently for the mere purpose of producing a highly spiced mixture.

One type of hero who figures largely in these stories is the vagabond boy, in the streets of a great city, in the Rocky Mountains, or at sea. Sometimes he has some cleverness in singing, or dancing, or ventriloquism, or negro acting, and he gains a precarious living while roving about. This vagabond life of adventure is represented as interesting and enticing, and, when the hero rises from vagabond life to flash life, that is represented as success. Respectable home life, on the other hand, is not depicted at all, and is only referred to as stupid and below the ambition of a clever youth. Industry and economy in some regular pursuit, or in study, are never mentioned at all. Generosity does not consist in even luxurious expenditure, but in wasting money. The type seems to be that of the gambler, one day 'flush' and wasteful, another day ruined and in misery.

There is another type of boy who sometimes furnishes the

hero of a story, but who also figures more or less in all of them. That is the imp of mischief,—the sort of boy who is an intolerable nuisance to the neighborhood. The stories are told from the stand-point of the boy, so that he seems to be a fine fellow, and all the world, which is against him, is unjust and overbearing. His father, the immediate representative of society, executes its judgments with the rod, which again is an insult to the high-spirited youth, and produces on his side, either open war, or a dignified retreat to some distant region.

These stories are not markedly profane, and they are not obscene. They are indescribably vulgar. They represent boys as engaging all the time in the rowdy type of drinking. The heroes are either swaggering, vulgar swells, of the rowdy style, or they are in the vagabond mass below the rowdy swell. They are continually associating with criminals, gamblers, and low people who live by their wits. The theater of the stories is always disreputable. The proceedings and methods of persons of the criminal and disreputable classes, who appear in the stories, are all described in detail. The boy reader obtains a theoretical and literary acquaintance with methods of fraud and crime. Sometimes drunkenness is represented in its disgrace and misery, but generally drinking is represented as jolly and entertaining, and there is no suggestion that boys who act as the boys in these stories do ever have to pay any penalty for it in after life. The persons who are held up to admiration are the heroes and heroines of bar-rooms, concert saloons, variety theaters, and negro minstrel troupes. From the specimens which we have examined we may generalize the following in regard to the views of life which these stories inculcate, and the code of morals and manners which they teach:

The first thing which a boy ought to acquire is physical strength for fighting purposes. The feats of strength performed by these youngsters in combat with men and animals are ridiculous in the extreme. In regard to details the supposed code of English brutality prevails, especially in the stories which have English local color, but it is always mixed with the code of the revolver, and, in many of the stories, the latter is taught in its fullness. These youngsters generally carry revolvers and

use them at their good discretion. Every youth who aspires to manliness ought to get and carry a revolver.

A boy ought to cheat the penurious father who does not give him as much money as he finds necessary, and ought to compel him to pay. A good way to force him to pay liberally, and at the same time to stop criticising his son's habits, is to find out his own vices (he always has some) and then to levy black-mail on him. Every boy, who does not want to be 'green' and 'soft,' ought to 'see the elephant.' All fine manly young fellows are familiar with the actors and singers at variety theaters, and the girl waiters at concert saloons. As to drinking, the bar-room code is taught. The boys stop in at bar-rooms all along the street, swallow drinks standing or leaning with rowdy grace on the bar. They treat and are treated, and consider it insulting to refuse or to be refused. The good fellows meet every one on a footing of equality—above all in a bar-room.

Quiet home life is stupid and unmanly. Boys brought up in it never know the world or life. They have to work hard and to bow down to false doctrines which parsons and teachers in league with parents, have invented against boys. To become a true man, a boy must break with respectability and join the vagabonds and the swell mob. No fine young fellow, who knows life, need mind the law, still less the police. The latter are all stupid louts. If a boy's father is rich and he has money, he can easily find smart lawyers (advertisement gratis) who can get the boy out of prison, and will dine with him at Delmonico's afterward. The sympathies of a manly young fellow are with criminals against the law, and he conceals crime when he can. Whatever good or ill happens to a young man he should always be gay. The only ills in question are physical pain or lack of money. These should be borne with gayety and indifference, but should not alter the philosophy of life.

As to the rod, it is not so easy to generalize. Teachers and parents, in these stories, act faithfully up to Solomon's precept. When a father flogs his son, the true doctrine seems to be that the son should run away and seek a life of adventure. When he does this he has no difficulty in finding friends, or in living by his wits, so that he makes money, and comes back rich and glorious, to find his father in the poor-house.

These periodicals seem to be intended for boys from twelve to sixteen years of age, although they often treat of older persons. Probably many boys outgrow them and come to see the folly and falsehood of them. It is impossible, however, that so much corruption should be afloat and not exert some influence. We say nothing of the great harm which is done to boys of that age, by the nervous excitement of reading harrowing and sensational stories, because the literature before us only participates in that harm with other literature of far higher pretensions. But what we have said suffices to show that these papers poison boys' minds with views of life which are so base and false as to destroy all manliness and all chances of true success. How far they are read by boys of good home influences we are, of course, unable to say. They certainly are within the reach of all. They can be easily obtained, and easily concealed, and it is a question for parents and teachers how far this is done. Persons under those responsibilities ought certainly to know what the character of this literature is."

WHAT SHOULD OUR BOYS READ?

Teachers can largely determine the reading of their scholars out of school. It is important not only to awaken a love of books, but to guide in their selection and form a taste for profitable reading. Scholars should be encouraged to have some good book always at home, in which they read a little every day. In school they should be invited to tell what they have read. To give an epitome of one's reading is an admirable school exercise. The pupil will peruse a book with ten-fold greater interest, when expecting to epitomize his author before the school. As a drill of memory and in language it is a most useful exercise, and is one that is sure to interest as well as profit the school. Having experienced these advantages in my own teaching, and witnessed them in many schools, I strongly recommend this practice, already adopted by some, to all the teachers of Connecticut. Instead of giving here a list of books for all the youth of the State, I advise teachers to recommend well known works in adaptation to the age, taste and advancement of individual pupils, usually those which they themselves have read, that they may the better appreciate and criticise the epitomes of the same by the pupils.

An eminent teacher recently asked a class of fifty-seven boys, What is the last book you have read? One answered "I haven't read any lately," another, "I don't remember," "can't tell" said a third. But the great majority were able to give an account of their reading, which was most creditable to their teacher, evincing his wholesome influence over his pupils outside of the school room. Twenty-seven had been reading works of history and biography, including Life and Times of Benjamin Franklin, Life of Prescott, Higginson's History of the United States, Irving's Washington, Lives of Cicero, Hannibal, Cæsar, Xerxes, Alexander, Ferdinand and Isabella. Three boys were reading Dickens' History of England and one was enjoying Bancroft's ten volume History of the United

States, another had just read three volumes of Macaulay's Essays. Shakespeare, Bunyan, Bulwer, DeFoe, Jules Verne and Oliver Optic had one reader each. What Career?, Avis, Marble Fawn, History of Propellers, Management of Horses, Seven Oaks, Miss Mühlbach's Empress Josephine, Ways of the World, Half-Hour Natural Science Series, American Explorers, Little Men, Speke's Sources of the Nile, Wide Wide World, Waverly, Fortunes of Nigel and Quentin Durward were also named.

I invite our teachers to test their scholars in the same way during the present year, and to send me lists of the books read by their pupils. With the coöperation of teachers and school officers we may learn what the youth of Connecticut are reading. This effort will enlist the attention of parents and secure their aid in the selection of better books and periodicals for their children, and thus check a growing evil and accomplish great good. Teachers should foster a taste for such choice literature, that travels, histories and biographies, books of science, genuine poetry, essays and choice romances shall take the place of the "blood and thunder" stories and other emphatically *weekly* novelettes of the day.

Social reading should also be encouraged. The industry in many a sewing circle has been enlivened by well selected reading by one of their number. The same genial influence should often cheer the circle around the family hearth. "Reading circles" ought to be maintained in every town, where selections in prose or poetry, often a play of Shakespeare, the several parts having been previously assigned, and made the subject of careful private study and drill, are rehearsed together. These Reading Clubs, where each thoroughly studies his part or selection till he becomes so possessed of its thought and spirit as to render it in the best style he can command, not only cultivate the art of elocution, but improve the taste and develop a higher appreciation of the best authors. Aside from the educational value of this class of evening schools, their social influence is happy. Divided as the residents of our rural districts too often are, by party or sect, by prejudice or neighborhood difficulties, every influence tending to fraternize the people should be welcomed; every association where they meet on common ground for mutual improvement, and where kindly

feeling and social amenities are cultivated, should be encouraged.

The teacher cannot awaken love of books unless he himself continues to be a student. Any one who thinks he knows enough to teach even the humblest class, should never profane the school room by his presence. One who has ceased to be a learner cannot be a good teacher. The more one has discovered, the more he wants to know. The truly learned man feels the greatness of his ignorance and the littleness of his knowledge as but a drop out of the boundless ocean of truth. It has been well said, "the greater the circle of our knowledge, the greater the horizon of ignorance that bounds it. The pride of wisdom therefore is the proof of folly." Arrogance and assurance are not the fruits of true learning. Yet from the days of Johnson to Dickens "the school master" has been characterized in our literature as magisterial, opinionated and dogmatical. Associated as teachers are with beginners, or at least inferiors in attainments, seldom called to the grapple of mind with mind as in forensic contests with equals or superiors, there is great danger of imbibing the spirit of conceit and dogmatism, even when only getting deeper in the old ruts. What is dryer than an old, opinionated, self-satisfied, unprogressive school master? He despises "all your new-fangled notions." He glories in the "good old ways." His fluent routine feeds his complacency, though it really enervates his own mind and stupefies his pupils. Whoever either in the college or primary school has ceased to learn, should by all means stop teaching, for children need impulse even more than instruction. Any one who no longer thirsts for higher knowledge, cannot fitly lead even the youngest to its fountain. As a teacher, one must be progressive, or cease to be at all. The mind that stagnates must soon retrograde, and such a teacher would stultify rather than stimulate his class. Happily there are now many teachers worthy of their work, whose ideal is high, and who are enthusiastic in the life-long work of personal culture. The efficient coöperation of such teachers I confidently anticipate in the efforts now making to stimulate a taste for books, and aiding our youth in the selection of the best books. One who early acquires a taste for reading and a love of books, will realize that his education

is only begun when his school days are ended. To complete it will be the aim and ambition of his life. Let his calling be what it may, with an insatiable desire for knowledge, he will find leisure for self-improvement. The many instances of self-educated men whose eminence and success are due to an early taste for reading, should be given to the boys who are just entering the active pursuits of life, and who are so apt to think that they can no longer find time for self-culture. But is the little leisure they have well improved? Should the evenings be idled away, because the days must be occupied with business or labor? The youth whose teachers have trained them to always have a good book at hand for odd moments, will enter the practical callings of life with a habit of inestimable importance.

COMPULSORY EDUCATION IN ENGLAND.

My observations during the last year, both at home and abroad, refute the old objection to obligatory education, that "the laboring classes won't stand it." In the County and State Conventions of the Labor Unions recently held in Connecticut, resolutions have been adopted in favor of the rigid enforcement of the law for the prevention of illiteracy. Mixing much with the laboring classes for the purpose of promoting school attendance, I have been greatly encouraged by their growing appreciation of education, whether Americans, Germans, Swedes or Irish. In England the various labor organizations earnestly advocate compulsory education. The opposition comes from the comparatively few land-holders, the politicians and large farmers. In Glasgow, where the coercive regime is in full vigor, but fifty-one penalties have been inflicted in three years. In Birmingham, where the proportion of illiteracy was far larger than in Glasgow, greater exertions have been requisite to vanquish the apathy of parents. In Scotland, education has long been well nigh universal, while the poorer classes in England and Wales were sunk in ignorance. Under the existing law, the regulation of attendance is left to the local School Boards. Recent interviews with prominent friends of education in England and Scotland, satisfied me that public sentiment is rapidly growing in favor of making compulsion universal in its application. I could learn of no signs of reaction in any town where it had been adopted, but was assured that in the School Boards of London, Glasgow, Manchester, Birmingham, Sheffield, Leeds, and many other large towns, there is not now left a single opponent to this plan. Throughout Britain experience has converted many objectors to friends.

Sir Charles Reed, President of the London School Board, gave me last summer some statements which happily illustrate the good influence of compulsory education in that great metropolis. The new system went into operation in 1871. The

school census then taken enumerated 574,693 children of school age, and needing elementary education. For these children only 262,259 school places were at that time provided, and there were 312,434 more children than places. Over two hundred new school houses have been provided since that date, and now the Board Schools and Voluntary Schools have accommodations for 505,323. The compulsory law has worked with little friction and marked success. As a result, there has already been a very considerable reduction in the cost of juvenile crime and pauperism. The magistrates of London and the Commissioners of Police have all borne cordial testimony to the fact that there has been a great diminution of juvenile offenses, and that every gang of young thieves known to the police has been broken up. The Superintendent of the Holloway Prison says the juvenile criminals have yearly decreased, so that instead of 136 males and 21 females admitted in 1869, the numbers for the last year were only 28 males and no females. In 1871, Hon. W. E. Forster, the father of the new educational bill, said to me, "In America you can have little idea of our difficulty in dealing with these myriads of street Arabs in London, who are so degraded and ignorant that they and their parents alike can appreciate neither the evils of ignorance nor the advantages of education." One of the inspectors now says, "These street Arabs sit side by side with the sons of industrious citizens, and so healthful is the tone of the school that complaints are seldom heard. These schools are of the deepest interest and first importance, receiving children from indigent and neglected homes, and supplying all that perhaps they will ever obtain of moral training and cultivation in head and heart. No one can continue to visit these schools and notice the sad state of these children at the outset without observing the gradual ameliorating effects of the care bestowed upon them."

By invitation of Sir Charles Reed, I witnessed in July last, the gathering of 5,000 of these children in Crystal Palace. The spectacle of so many children seated in ascending tiers in a semi-amphitheater near the great organ, was itself inspiring, and the grand choral singing, especially considering the brief period of their school attendance, was excellent. Besides the

5,000 singers, there was an enormous crowd of other children and their parents, the total number, said the President of the Board, was over 30,000. The Crystal Palace Company gave free admission to the children. Tom. Hughes, the President of the Company, made a speech of cordial welcome to all, and congratulated and commended the School Board that had already accomplished so noble a work. The main speech was given by Lord Sanden, a single sentence of which indicates the moral influence already exerted by the London schools. "When we think of the future of the children before us and of the various lots in life which will become theirs, it is impossible not to be deeply affected, or to look at these children without being grateful to Sir Charles Reed and his colleagues, for bringing these children into school, who might otherwise have been left in the streets, a plague to their parents and a danger hereafter to the State." Similar facts might be given as to the good influence of compulsory education in many other cities of England, and especially in Birmingham, the head-quarters of the National Educational League,—an association embracing such men as George Dixon, M.P., and Dr. R. W. Dale,—which has been active and influential in the advocacy of educational reforms. Visiting most of the schools of that city last summer, I gained ample proofs of the good effects of obligatory instruction, as there rigidly applied.

A striking conversion occurred in the case of the late Canon Kingsley. Though he long took a lively interest in the improvement of the working classes, an interest deepened by his service as government inspector of schools, he at first opposed obligatory education as un-English and offensive to the independent spirit of his countrymen. On finding that the working people favored compulsory attendance, his objections vanished.

A still more remarkable change has occurred in the views of Mr. Forster, the father of the Educational Act of 1870. He then opposed all efforts to make compulsion universal. Permission only was given to local Boards to adopt coërcion. Though convinced of the justness of this measure, he argued that the people are not prepared for it, and that outcries of "un-English," "arbitrary," "tyrannical," "invasion of one's home," "usurpation of parental rights," and all the easy clap-

trap of demagogues, would create a reaction, and therefore he did not ask for a general compulsory law. It was said, no matter what can be done in Prussia, or even in Switzerland, the people of England have too much independence, too much aversion to any semblance of tyranny, ever to submit to compulsory education. Mr. Forster now admits that he had no expectation that the town population would, to so great an extent, adopt the principle of compulsory education. Every town in England with 20,000 inhabitants, which has a School Board, has adopted it. The permissive provision for local compulsion was ingrafted in this bill with little faith that it would be ratified and applied in any of the large towns. But the people have surprised Parliament. In March last Mr. Forster said in the House of Commons: "Almost the entire *town* population of England is now under compulsory education. And there is no sign of reaction. If compulsion had worked with hardship on the people, nothing was so easy as to revert to the former state of things. If a motion were now made antagonistic to this principle of compulsion, *it would not have a single supporter in the School Boards of London, Manchester, Birmingham, or any other large town.* The school attendance in those towns where it has been made compulsory, has been improved 30 per cent. Leeds, for example, had almost solved the problem of getting hold of all the children. The attendance there has doubled by compulsion. The same has been done at Sheffield. At Stockport they had increased the average attendance until there were less than 2½ per cent. of the children between 5 and 15 who were not at school, and some of them were excusable on account of mental or physical inability. The right to compel a father to feed and clothe his child is admitted, and we have now arrived at a point of civilization at which we can declare that it is his duty to see that he is educated. The sole meaning of compulsion is that this is the duty of every parent, and that it is the business of the State to secure the performance of that duty, and if the parent is disabled by poverty, then to help him from local rates or imperial funds. It has been said, we must wait for public opinion. Well, public opinion has declared itself, for every town that by law was able to do so, has put the compulsory

system in force. The fact is, that the arguments in favor of compulsion are overwhelming, and Parliament should now make compulsion universal. It is admitted, you cannot extend compulsion without producing some hardship, and bringing a bitter pinch to some poor widow who depended on her children's labor. No great reform can be effected without cases of individual hardship, but in the long run these alterations would be productive of magnificent results for the whole population."

In Connecticut the gain in attendance since the adoption of our compulsory law, shows the wisdom and value of the enactment, and amply compensates for all the effort put forth to secure its general observance. Besides the systematic work of the Agent, I have kept in view the needs of neglected children in my visits to towns, schools, and factories, and in conferences with school officers, and in public lectures. The chief trouble has not been with the large manufacturers, who, as a rule, have cordially coöperated with us, but with the far greater number who employ a few children in shops, or stores, or a single one on the farm, or in the family. Our law applies alike to *all* employers of children, to farmers, mechanics, and merchants, as well as to manufacturers. Up to the present date, rigid as is this law, no opposition to it has ever been expressed, so far as I can learn, either in the legislature, in the press, or in any public meeting.

This law should not relax our efforts at persuasion and in making our schools so attractive, and their substantial advantages so inviting, that none can afford to lose them so that attendance shall be regarded as a privilege rather than a legal necessity. But when reason, persuasion, and patriotism all fail, coercion should stand in their stead. The law should protect helpless childhood whose rights are sacred. It recognizes the claims of the humblest child to an education as that which the state cannot neglect without detriment to itself, and harm to a human soul. Not even by omission may the State doom a single child to ignorance and its manifold evils. The temporary hardships occasionally incident to the observance of this law, will be counterbalanced a thousandfold by the permanent advantage of both parents and children, but its neglect will inflict lasting evil upon them and the whole community.

This book should be returned to the Library on or before the last date stamped below.

A fine of five cents a day is incurred by retaining it beyond the specified time.

Please return promptly.